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MOTORSHIP

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In the Interests of Commercial Motor Vessels

Vol. 2 JANUARY, 1917 No. 1

SEATTLE NEW YORK

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"P. R. T. No. 1." EQUIPPED WITH 100 b. h. p. "AVANCE" OIL ENGINE

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MOTORSHIP

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Vol. 2 Seattle, U. S. A., January, 1917 No. 1

Cramps Building Large Motorship

Motorship makes the exclusive authorized announcement of a 12,000 ton displacement motorship now being laid down at the shipyard of William Cramp & Sons Ship & Engine Building Co., of Philadelphia.

This vessel will be 420 feet in length and equipped with twin Diesel engines aggregating 3.100 i. h. p. of the Burmeister & Wain type, also to be built by Cramp's, who some time past secured the exclusive license for the manufacture of these engines in the United States.

These engines will be similar to the installation in the East Asiatic motorship "Peru," described and illustrated in our November issue, and which are six-cylinder, four-cycle, direct reversible Diesels operating at 125 r. p. m., developing in aggregate 3.100 i. h. p., which gives the "Peru," a vessel of similar dimensions, a speed of 11.15 knots with considerable reserve. During her trials over the measured mile at Copenhagen last August the Peru averaged 12.74 knots at 3.685 i. h. p. and 139.3 r. p. m.

The significance of the above announcement made may mean nothing to the man on the street, but to American shipping it is an epoch in history.

Complete details of this vessel, her engines and equipment will be published in Motorship as soon as available.

Read the complete report of the East Asiatic company, which we give in full in this issue, then rub your eyes and acknowledge that instead of a nation of oil engine manufacturers we are a bunch of farmers.

These Continental inventors of Diesel engines were not inspired, but just normal beings like ourselves. While we were fooling away our time trying to get 50 miles per hour out of a 20-foot hydroplane, they were silently spending millions of dollars in oil engine experiments with the object of superseding steam in the propulsion of vessels, owing to its revolutionary economy in cost of operation.

The oil fields of the United States are our birthright, but unfortunately we have been blind to our possibility of developing a Diesel-driven mercantile marine which would defy other nations in competition for our share in the ocean commerce of the world.

The enterprise, therefore, of William Cramp & Sons, of Philadelphia, to step in and endeavor to show the way is worthy of praise for it is undertaken while this corporation is loaded to capacity with orders for steam vessels.—Editor.

CONVERSION OF S. S. "ZAFIRO."

An interesting installation is being made in Vancouver, British Columbia, of a 400 b. h. p. Atlas Diesel in the former steamship "Zafiro," together with extensive alterations which will enable this vessel to engage once more in ocean freight service as an auxiliary motorship.

S. S. "Zafiro," a flush deck steel vessel, was built in 1884 by Hall, Russell & Co., at Aberdeen, Scotland; is of 1,062 gross and 675 net tons, 213.7 in length by 31.8 beam, 21.3 depth of hold.

At the time of the Spanish American war she was purchased by the U. S. Government and after a varied career passed through the hands of both Eastern and Western junk dealers, following which she was stripped of everything movable.

M. S. "Zafiro" is to be entirely sheathed with wood between which and her plating will be a layer of felt. Five pole masts are to be stepped on which are rigged gaff and boom sails, a short jibboom and two head sails, a handy square sail to be set on the foremast; cargo booms are called for by way of hatches. The deck officers and engine room staff are to be quartered in a deck house aft with captain and chief officer's rooms, galley and saloon amidship with wheel house and bridge above same.

There are three cargo hatches, one forward of bridge and two aft. Capt. S. F. McKenzie of Vancouver is attending personally to this work now in hand.

ENGLAND'S COAL-FUEL ANNOUNCEMENT.

An unexpected encouragement of motorships has come in England's recent announcement that she could not guarantee coal at any of her bases the world over, except to ships conserving the Allied interests.

If the war continues to any length of time, and American ships engaged in overseas trade have difficulty in obtaining coal at ports where they call, it will pay shipowners to rip out good steam engines and boilers, lay the ships up a month or six weeks, and have Diesel oil engines installed.

It is clear that a steamer having to carry enough oil or coal for a round voyage to foreign ports will encroach upon her cargo space to an alarming extent, which will not effect motorships to the slightest degree, for already such vessels carry enough fuel for several long voyages.

For instance, a Diesel ship of 6,000 tons cargo capacity will only need 350 tons of oil fuel in her bunkers to make a round voyage from New York to London and back.

An oil-fired steamer of the same capacity (even if gear-reduction-turbine driven) will have to carry over 1,000 tons of oil fuel for the same voyage.

A coal-burning steamer would have to carry about 1,300 tons of coal in her bunkers.

Carrying such large quantities of fuel means the continual absorption of valuable cargo space, which must cause shipowners to turn to motorships.

1,000 HORSE POWER REVENUE CRUISER.

Among the Diesel-engined vessels in the service of the Russian navy, may be mentioned the "Yastreb," a vessel of 370 tons displacement, equipped with six Hotchkiss quick-firing guns, four of 57 mm. bore, and two of 30 mm. bore. This vessel is 159½ feet long overall, by 152 feet 9 inches b. p., with 20 feet 3 inches extreme breadth, and a mean draught of 7 feet 3 inches. She is driven by two 500 b. h. p. Nobel four-cycle type Diesel oil engines, which gives her a speed of 15 knots. The main and auxiliary machinery of this vessel weighs 79½ tons, and the fuel weighs 65 tons. Very little space is required for the machinery, each engine being but 19 feet long by 4 feet wide, and 7 feet high above shaft centers.

DUTY ON MARINE OIL ENGINES.

The law in connection with tariffs on marine oil engines needs amending, because of its unfairness. The customs duty imposed is in accordance with Par. 167 thus classifying them under manufactures of metal not especially provided for, at 20% ad valorem; whereas marine steam engines are classified under Par. 165 at 15% ad valorem. Owing to the inability of the domestic market to meet the enormous demand for oil engines large orders have had to go to Europe, and the high duty makes the ultimate price very high. In certain cases, however, marine oil engines are admitted duty free, and in other certain cases 99% of the duty paid is rebated.

SALE OF MOTORSHIPS.

The motorships "Rose Mahony" and "Andrew Mahony," now under construction at Benicia, Cal., have been sold by A. F. Mahony to the Standard Oil company.

CONVERSION OF OLD-TIMERS.

The schooners "Mayflower" and "Albion" have been purchased by the American Products company, of San Francisco.

For many years these vessels operated between Albion and Coquille River in the lumber trade.

Mayflower was built in 1888 and the Albion in 1886. The new owners will install auxiliary oil engines in these vessels and use them in the kelp industry in Southern California.

M. S. "Oregon," 2800 I. H. P.

Through the courtesy of J. F. Metten, chief engineer of the William Cramp & Sons Ship & Engine Building Co. of Philadelphia, we are enabled to illustrate this most interesting contribution by J. C. Shaw, also associated with the above company. This firm are the sole American licensees of the manufacturing rights of the Burmeister and Wain Diesel engines.

The writer, a few months ago, had the good fortune to take a short trip, from Philadelphia to the Delaware breakwater, on the motor ship "Oregon," and a description of the machinery with an account of her performance should be of interest to the readers of MOTORSHIP.

The "Oregon" was put into commission last April and, although not one of their largest vessels turned out, shows Messrs. Burmeister & Wain's latest practices in construction of their well known engine and arrangement of machinery.

The "Oregon" was under a short charter to take a load of coal from Philadelphia to Havana, Cuba. It was not thought, until a short time before sailing, that the vessel would be able to get away that afternoon, it being Sunday and all coaling operations stopping at 6 o'clock. Unexpectedly the coal, which was put in by chute, was all aboard a few minutes before 6 o'clock and the vessel was ready to leave immediately. With a Scotch boiler installation they would probably have been delayed several hours. Another occasion, illustrating the superiority of the Diesel vessel in this respect over the steam ininstallation, was when it was found necessary to stop unexpectedly off Wilmington for the night for fear of getting afoul of the hawsers of some dredges anchored near the roadway. All fuel consumption, except for one auxiliary set carrying the lighting load, ceased the instant the main engines were stopped, there being none of the usual standby losses common to a steam engine plant.

The vessel, owned by the United Steamship company, has a length of 405 ft., beam 54 ft. and draft of 25 ft. 6 ins., corresponding to a dead weight capacity of 8,270 tons. The combined indicated horsepower, designed, of the two main engines is 2,800, when running at 140 revolutions per minute, which gives the vessel a speed of 11 knots fully loaded.

The main and auxiliary engines are of the pure Diesel type and operate on the four-stroke cycle with crank cases inclosed.

The main engines have six cylinders each of 590 mm. (23.22 ins.) bore by 900 mm. (35.41 ins.) stroke. The cylinders are cast in blocks of three, with separate liners, and supported on eight "A" frames. These frames are furnished with two through strain bolts each which pass from the top of cylinder blocks to the underside of bed plate to each side of bearing, there being a bearing corresponding to each "A" frame. This eliminates any possibility of broken frames.

The space between the two blocks is occupied by a train of spur gears for driving the cam shaft, fuel pumps and arm for inertia governor.

In the cylinder heads, which are cast separate, is located the fuel valve in middle, with inlet and exhaust valves symmetrically placed to either side. The starting valve, seen in Fig. 2, is placed towards the back and is brought into operation automatically by the starting air itself. This is accomplished by a piston, forming part of the stem, elongating the stem and bringing the roller on push rod in contact with the starting air cam.

There are two sets of cams, one for ahead and one for astern, which are placed side by side on same cam shaft. These are brought into operation by shifting the cam shaft axially, the rollers on ends of push rods being raised from the cams momentarily by means of a lay shaft. The shifting is performed by an air piston acting against an oil brake piston in tandem, seen in Fig. 3. This works at its upper end a bent bar for shifting a thrust bearing, controlling cam shaft position, and a rack and pinion for turning of lay shaft.

There is an oil pump for each cylinder and

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driven from a common cross-head through eccentrics on internal spur gear shaft. The earlier engines had one pump with a distributing manifold and cocks but these have been replaced with the independent pump per cylinder as in all later designs. With the one pump arrangement there is a possibility of a repeated overcharge of oil to one cylinder with possible damage to engine.

The crank shafts are standard steam engine practice, being built up and in two parts. The compressors for supplying injection air are driven off the forward ends of crank shafts.

The port engine is merely the starboard engine turned round and with compressor bolted to opposite end. This makes all parts of vital importance interchangeable, reducing the number of spares required to be carried aboard to a minimum.

The cylinders, cylinder covers and guides are salt water cooled, the discharge from cylinder covers passing to jackets surrounding exhaust manifold. The pistons are oil cooled, although in the larger size engines these are salt water cooled. The temperature of the oil from the piston can be noted through small inspection doors in back of "A" frames.

The fuel control is by varying the time of closing of the mechanically operated suction valves of pumps through rocker arms with eccentric bearings controlled by hand levers through links. There are two hand levers, seen in Figs. 1 and 3, each controlling three cylinders each, which may be operated separately. The levers, as seen in Fig. 1, are at stop position. The first notch position on quadrant admits starting air, there being only a slight hesitation at this position until engine is turned over about one revolution, when levers are pushed all way back giving full charge of oil to cylinders. The levers are then pulled back to desired running position.

The arrangement of machinery in engine room is shown in Fig. 4. All auxiliary machinery as well as steering gear, deck winches and anchor hoist is electrically driven, the current being supplied by the three auxiliary Diesel engines driving dynamos.

When at sea one auxiliary set is sufficient for all purposes. When in port two sets are sufficient for the winches and lighting, the third being standby. When getting under way with anchor hoist to be operated and the maneuvering compressor running, all three are generally kept running for a short time. The maneuvering compressor is run when there is any possibility of doing any maneuvering, the surplus air being discharged to a silencer under the engine floor.

The maneuvering air tanks are stored with air by maneuvering compressor to about 350 lbs. These are of ordinary boiler plate construction and suspended from engine room deck. The air bottles between engines are for fuel injection with air at about 900 lbs. pressure, stored automatically by the three stage compressors attached to main engines. The auxiliary engines have their own independent compressors and bottles for starting and fuel injection, not shown, but are usually started from the maneuvering air tanks. In case the vessel is new or the starting air has been lost through some mishap, a small two-stage steam driven compressor is used for storing up one of the flasks of one of the auxiliary engines. This permits the auxiliary engine to be started which in turn supplies current to maneuvering compressor.

The donkey boiler, which is oil fired, has about 100 square feet heating surface and is used also for heating of vessel and operating of fire extinguishers.

There are two motor driven cooling pumps, one of which is kept as spare. There are also two sets of lubricating pumps, one for spare. Each set consists of a motor driving two rotary pumps, each pump supplying both engines and of sufficient capacity each, should one pump fail.

Two motor generator sets, one of which is spare, are for changing the voltage from 220 to 110 for lighting, required by Danish law. They also have a steadying effect on the lights when winches are in operation.

The daily supply tanks, which also act as settling tanks, are placed at the forward engine bulkhead, with bottoms about on level with tops of cylinders giving the necessary head to the fuel oil pumps. The two large ones hold from five to six tons each, are provided with outside calibrated scales and are drawn on alternately. The small middle tank is for a lighter oil for starting up and shutting down the auxiliary sets in case the main oil supply is very heavy.

The two exhaust silencers for main engines are located in a small house on upper deck. There is a water coil in each for heating water for sanitary purposes.

The stack is on top of the silencer house. Inside the stack proper, but with their ends showing, are five pipes. The middle pipe is for smoke from boiler and the three smaller ones around front side for each auxiliary engine, the fifth being for steam exhaust from compressor. The exhaust from main engines is led through two pipes placed to either side of stack. This arrangement permits the exhaust from any of the engines to be noted independently at a glance

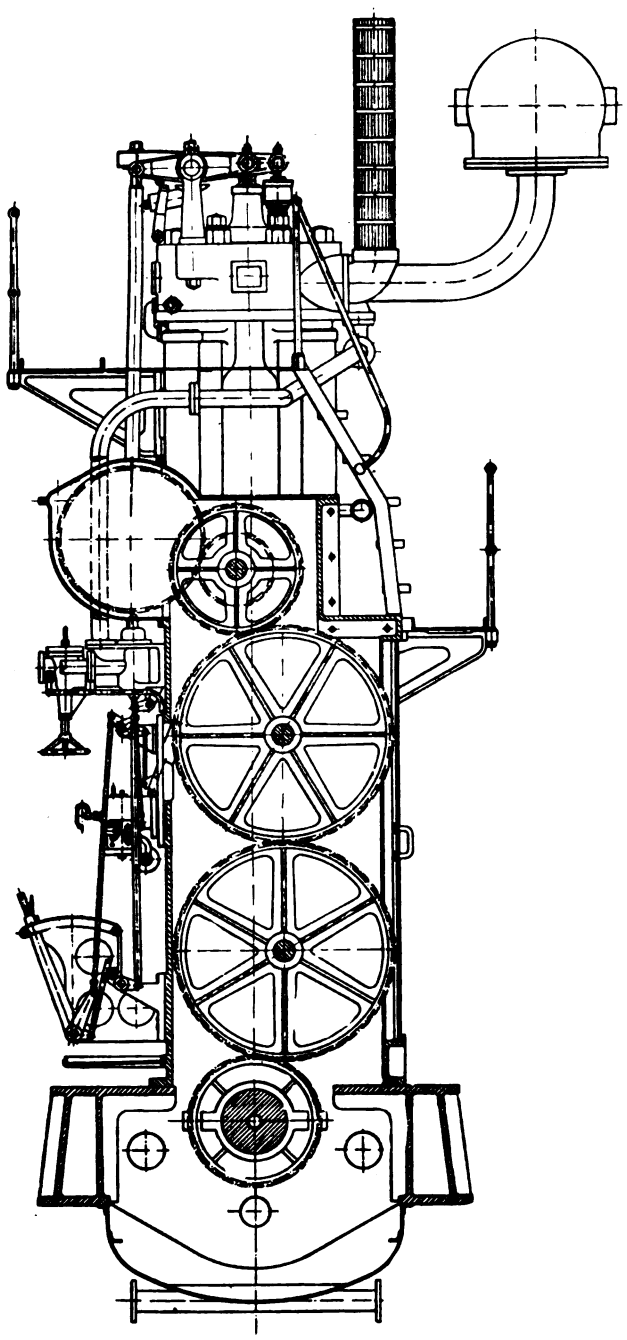

FIG. 1

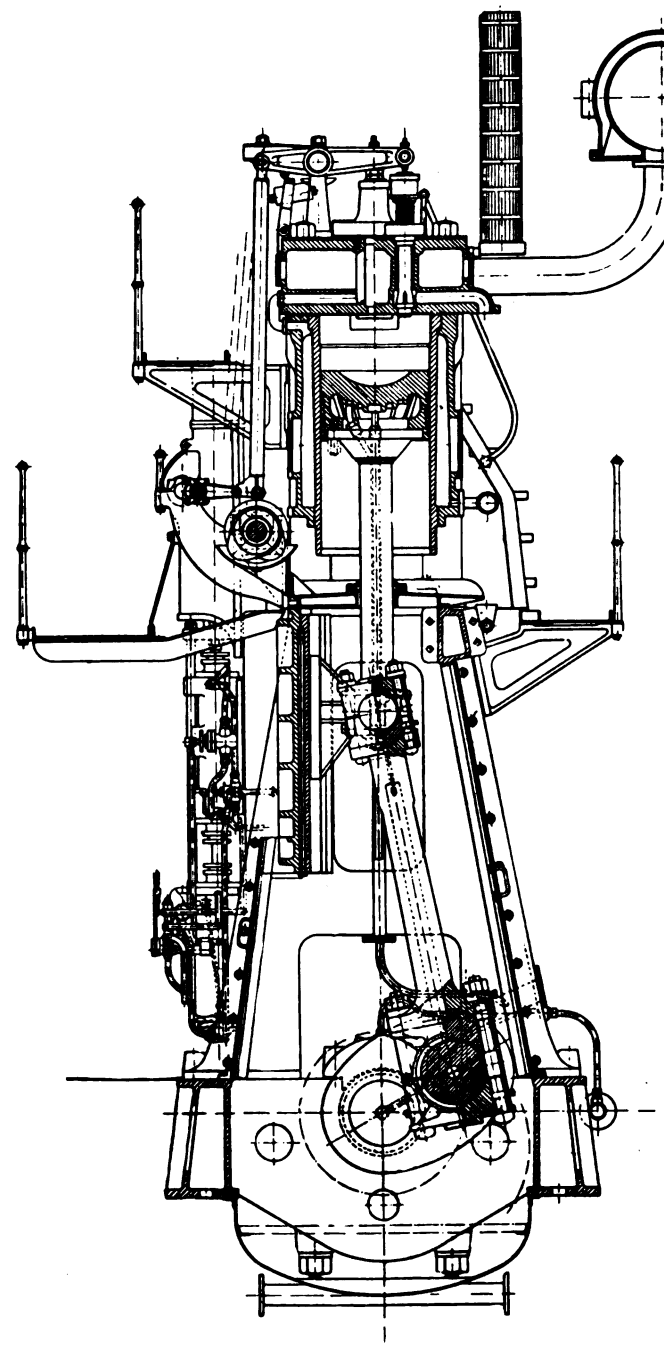

FIG. 2

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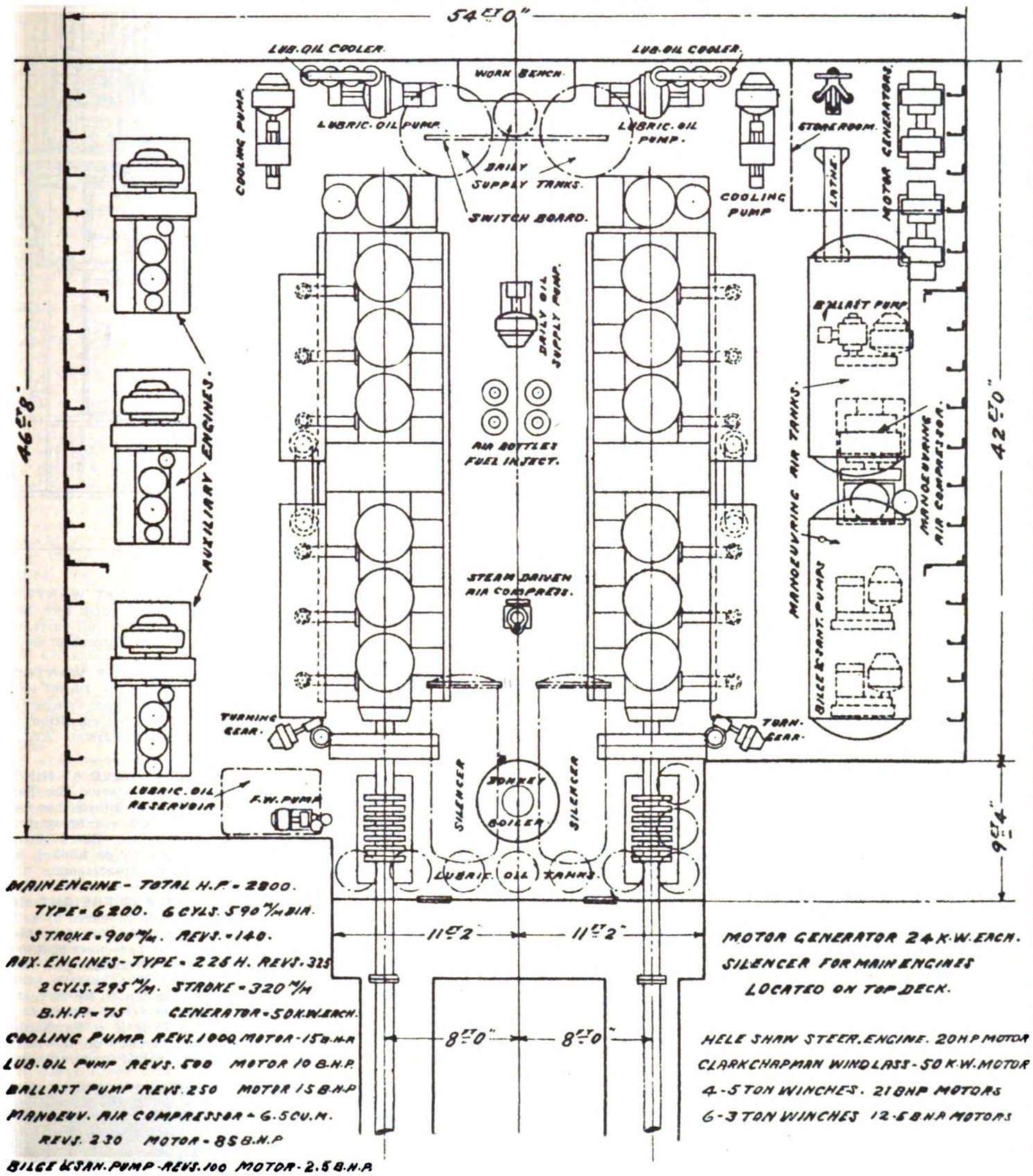
ARRANGEMENT of MACHINERY.

MOTOR SHIP "OREGON."

BURMEISTER AND WAINS' DIESEL ENGINES.

WM. CRAMP & SONS S. & E. B. CO. SOLE U.S. LICENSEE.



MAIN ENGINE - TOTAL H.P. = 2800.
TYPE = 6200. 6 CYLS. 590 m/m BIA.
STROKE = 900 m/m. REVS. = 140.
AUX. ENGINES - TYPE = 225 H. REVS. 325
2 CYLS. 295 m/m. STROKE = 320 m/m
B.H.P. = 75 GENERATOR = 50 K.W. EACH.
COOLING PUMP REVS. 1000 MOTOR - 15 B.H.P.
LUB. OIL PUMP REVS. 500 MOTOR 10 B.H.P.
BALLAST PUMP REVS. 250 MOTOR 15 B.H.P.
MANOEUV. AIR COMPRESSOR = 6.5 CU.M.
REVS. 230 MOTOR = 85 B.H.P.
BILGE & SAN. PUMP REVS. 100 MOTOR - 2.5 B.H.P.
DAILY OIL SUPPLY PUMP. MOTOR = 4 B.H.P.
DONKEY BOILER 100 lbs H.S. FITTED FOR BURNING OIL.
STEAM AIR COMP. 500 REVS. 14 CU.

MOTOR GENERATOR 24 K.W. EACH.
SILENCER FOR MAIN ENGINES LOCATED ON TOP DECK.

HELE SHAW STEER. ENGINE. 20 H.P. MOTOR
CLARK CHAPMAN WINDLASS - 50 K.W. MOTOR
4 - 5 TON WINCHES. 21 B.H.P. MOTORS
6 - 3 TON WINCHES 12.5 B.H.P. MOTORS

SCALE - 1/8" - 1 FOOT. (APPROX)

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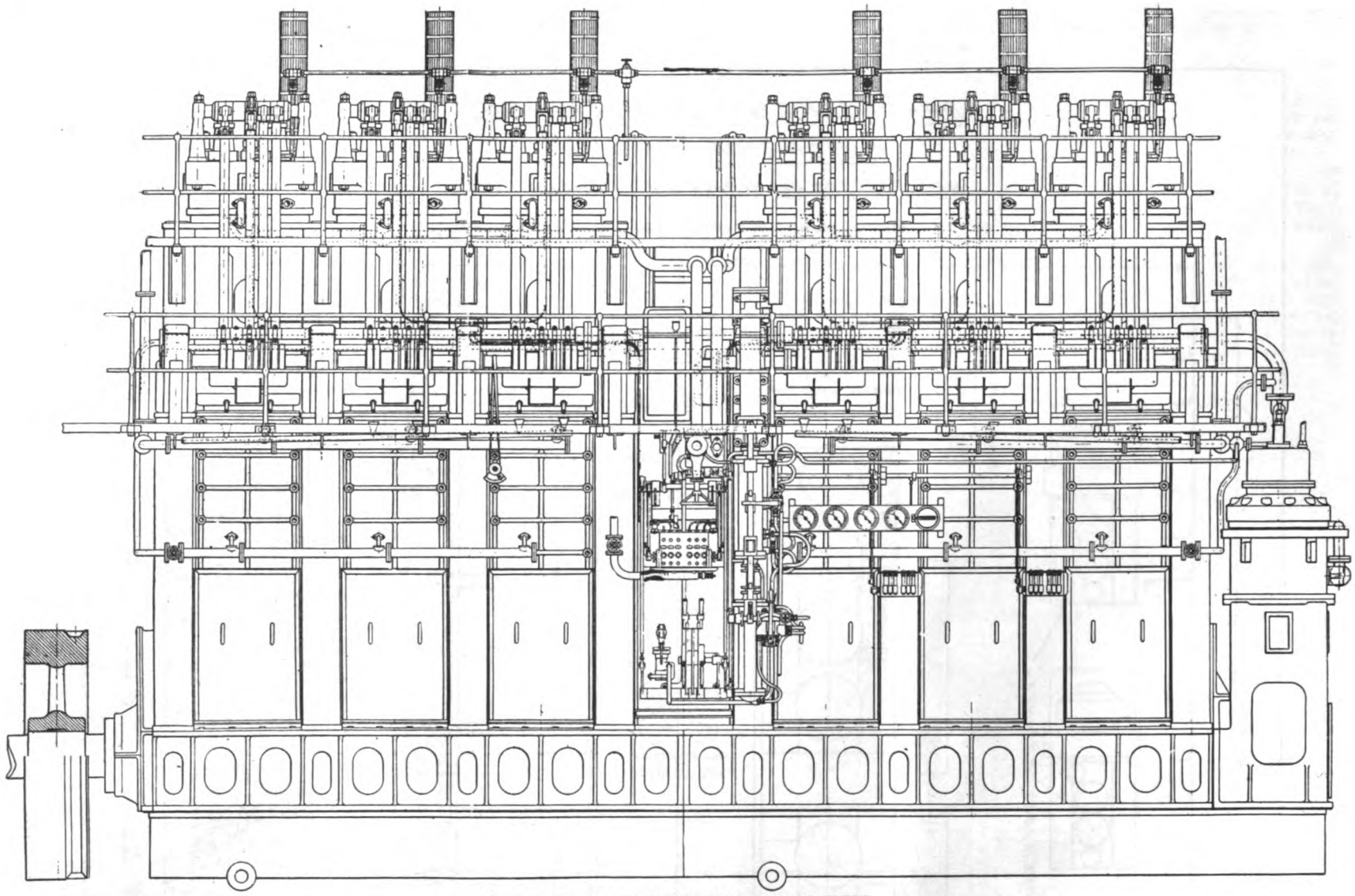


FIG. 3—1,400 i. h. p. BURMEISTER & WAIN DIESEL

from the bridge, and which is considered very important. The exhausts from main engines were remarkably free of all smoke, the gases being completely invisible. The auxiliary sets showed a slight puff of smoke with a sudden change of load.

Special precautions are taken that none of the waste cylinder oil can reach the crank cases, this oil not being reclaimed. For engine cylinders and compressors 2-R oil is used, about thirty pounds per day being consumed. This is fed through vacuum lubricators, there being two per cylinder. For main lubrication D. T. E. Heavy Engine Oil is used, about 100 pounds being consumed per 24 hours. For the main engines this drains to two tanks in inner bottoms, from which it is drawn by rotary pumps and forced through filters and coolers at 15 pounds pressure.

The consumption of fuel oil for all purposes when under way is from 8½ to 9 tons per 24 hours, developing 2,600 to 2,800 i. h. p. When in port and the winches are in operation the consumption is about four-tenths of a ton and well justifies the builder's judgment in having all auxiliaries electrically driven.

The fuel on board was obtained in New York on a previous trip, costing $12.60 per ton, and was unusually light, about 32° Bé. The oil usually used by these vessels is Borneo crude or California crude of about 24° Bé.

The economy improves with service. On the official trials of the "Oregon" the consumption for all purposes on i. h. p. of main engines was .317 lbs. with Borneo oil of about 18,000 b. t. u. This is equivalent to about .415 lbs. b. p. h., all purposes. In service the consumption is actually about .295 lbs. per i. h. p., all purposes, with American oil.

On entering the engine room for the first time one is impressed with the cleanliness and freedom from lubricating oil, also with the coolness of the engine room, this being contributed to by the very effective lagging of all exhaust pipes with asbestos roping. With the engines running at full speed there is no perceptible vibration. Maneuvering is very rapid, there being no attempt to nurse the engines.

The exhaust valves are changed every three to four months and an inspection of one that had been in service this time showed no pitting. These valves have a special cast iron detachable seat. All valves are contained in cages and the spares are held in racks on hatch walls above the engines.

The engine personnel consists of a chief and three assistant engineers, the chief not standing watch. In addition there are four sub-assistants and four oilers, making twelve in all. The machinery once started requires very little attention, it practically running itself.

WANT MOTORSHIPS FOR LUMBER TRADE.

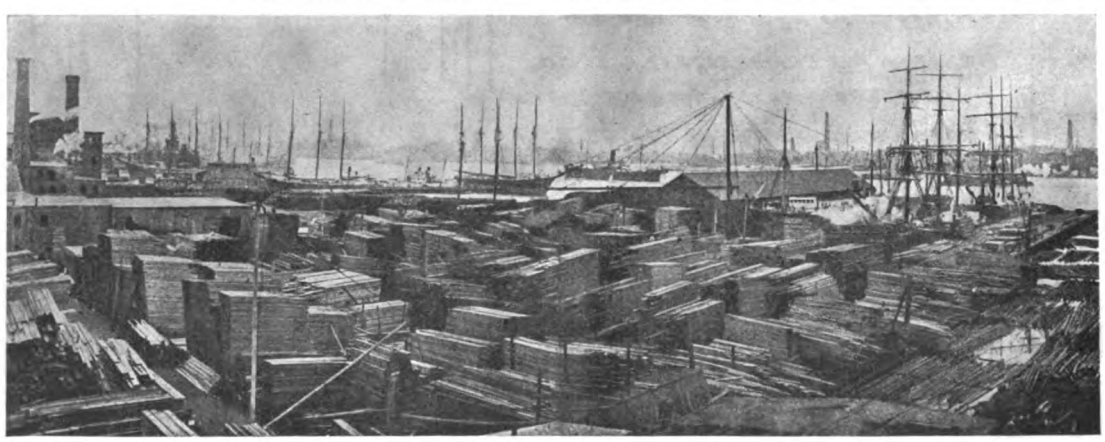
38 Kilby Street, Boston, Mass.

Editor Motorship: We are looking around for some motorships, and we wish that we could find one or two such as they are building on the Pacific coast which we could buy at a reasonable price. Should you happen to hear of any for sale, we wish that you will let us know.

Our docks are capable of taking care of any of the larger ships such as the "Atlantic and "Pacific," which came to us a year ago.

We are very much interested in your magazine and think that it should have a large circulation. We are telling a number of our friends about it. We enclose herewith $3.00 for one year's subscription.

W. F. Brown & Co., Inc.
Per Wendell F. Brown, Pres.



HUGE LUMBER YARD OF W. F. BROWN & CO., BOSTON

GASOLINE BOAT WANTED.

A gasoline boat about fifty feet long, suitable for deep sea fishing. Give full particulars regarding boat. Box 22, Care Motorship, Seattle.

DIESEL ENGINE WANTED.

Wanted 100 to 150 h. p. Diesel engine, either stationary or marine type; single or multiple cylinder; must be in good condition. Paramount Motor Co., 1432 South Parsons Ave., Columbus, Ohio.

M. S. "ELBRUZ" HELD AT NIKOLAIA.

Ever since the war started the Belgian-owned Diesel-driven motorship Elbruz has been held up at Nikolaia in the Black sea, being unable to pass through the Dardanelles. She is fitted with two Werkspoor motors each of 1,360 i. h. p. and is of about 9,000 tons displacement.

NEW PASSENGER AND FREIGHT MOTORSHIP.

Plans are now being prepared by L. H. Coolidge, naval architect, Seattle, for a wholesome combination freight and passenger boat to the order of the Lummi Island Navigation Co., Seattle, Frank Wright, president. The vessel's general dimensions are 65 feet in length by 20 feet beam with a moulded depth of 6 feet 4 inches. The power will consist of a 75 b. h. p. Fairbanks-Morse Co. type oil engine. Tenders on the construction of this vessel will be called for at an early date.

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Operations for Four Years of the East Asiatic Company

In consequence of the widespread interest in the performance of commercial vessels of large types, "Motorship" reproduces herewith the report in full from 1911 to 1915 inclusive of the East Asiatic Company, which operates a large fleet of vessels from Copenhagen to all parts of the world.

Report for 1911.

During the past year the company, in addition to its own tonnage, has employed 26 chartered steamers with a loading capacity of altogether 160,000 tons dead weight.

Appendix.

The M. S. "Selandia's" successful trial trips have established an active interest in the question of Diesel engines for marine propulsion. A few facts relating to the new vessel may therefore prove of interest.

In the report for 1910 it was stated that three vessels of 6,800 tons d. w. each had been ordered about the end of that year. By means of a more advantageous freeboard the carrying capacity of each has since been increased to 7,400 tons.

The M. S. "Selandia," the first of these vessels, is a twin screw vessel provided with accommodation for twenty first-class passengers. She is propelled by two main Diesel engines of 1,250 horse power each and is, besides, fitted with two auxiliary motors of 250 horse-power each, driving the electrical loading and discharging machinery, pumps, steering gear, electric light, refrigerators, ventilators, etc.

The "Selandia," after several satisfactory trial trips, was taken over from Messrs. Burmeister & Wain on the 17th of February, 1912. She is now on her way to Bangkok via Norresundby, Antwerp, Genoa, Colombo, Penang and Singapore. She left Copenhagen on the 22nd of February, and Antwerp on the 7th of March. Her motors, electrical winches and steering gear have been working satisfactorily.

The technical experts from Denmark and abroad who attended the trials and crossed the North Sea in the "Selandia," have expressed themselves in a highly appreciative manner as regards the use of Diesel engines for marine propulsion.

The M. S. "Jutlandia," building at Messrs. Barclay, Curle & Co.'s yard at Glasgow—the engines being designed by Messrs. Burmeister & Wain—is expected to be completed about the end of April, and the M. S. "Fionia," building at Messrs. Burmeister & Wain's, at about the end of May.

The company was induced to build motor vessels in consequence of the following advantages:

1. The savings effected by using oil instead of coal may, under the oil contract made by the company over a series of years, be estimated at more than 50 per cent.

2. The increased loading capacity obtained through less weight of machinery, as well as increased cargo space gained by the absence of coal bunkers, and larger carrying capacity owing to difference in the respective weight of quantities of oil and coal.

3. Calling at ports for filling bunkers and loss of time connected therewith are avoided. A steamship on the Far Eastern trade will require to coal at eight or ten different ports, whereas a motor vessel need only take in oil at one or two ports. Further, the drawbacks attending coaling and stoking are got rid of, savings are in this way effected and expenses for maintenance reduced. Moreover, there is no heating of the vessel from the boilers which, particularly in the tropics, is of great importance to the cargo and also the danger of spontaneous combustion is diminished.

4. The cost price of a motor ship like the "Selandia" is about 10 per cent higher than that of a corresponding steamship, but on the other hand the loading capacity is larger by about 10 per cent, so that the gain per ton carrying capacity will amount to about the same.

From Messrs. Burmeister & Wain the company have further ordered two twin screw motor vessels each of about 10,000 tons carrying capacity. They are intended for the China-Japan line, and are expected to be ready in the spring of 1913.

All the five ships are designed for an average speed of 11½ knots fully loaded.

Report for 1912.

Shipping Department.—Of the motor vessels referred to in our last report, the "Fionia" was transferred to the Hamburg America Line immediately after completion, whereas the "Selandia" and the 'Jutlandia" were placed for service on the Siam Line in February and June respectively. The experience gained by the performance of these vessels came up to expectations. The motors worked satisfactorily in the different weathers and climates ,and the two essential points, viz: savings derived from the consumption of oil as compared with that of coal, and the increased earnings from freight owing to the comparatively larger carrying capacity of the motor ships, fulfilled expectations (see appendix).

In order to utilize the advantages offered by this type of vessels on special routes where the supply of oil can be obtained on moderate terms, the company, as shown by the annexed list of its fleet, has now in course of construction seven additional motor vessels, aggregating about 60,000 tons dead weight. Also installations of Diesel engines in the S. S. "Bandon," "Chumpon" and "Pangan" have been contracted for and three new steamships, each of about 7,000 tons dead weight, have been ordered for the South Africa Line. Under these contracts the delivery of the vessels mentioned above is to take place from the spring of 1913 to the autumn of 1914.

As appears in the summary reports on the operations of the company of the first ten and fifteen years of its existence, accompanying the annual reports for 1906 and 1911 respectively, the vessels of the company are specially built for liner service, and are therefore more expensive than ordinary cargo vessels. The aveage cost per dead weight ton of the vessels built to the order of the company up to the close of 1911 amounted to £10 13s. 10d., whereas for the vessels under construction it will amount to £10 18s. 0d., or only about 4s. more, although three-fourths of the new tonnage are motor vessels. This is due to the fact that larger ships of the company's type are comparatively cheaper than smaller vessels.

The Siam Line, outwards, had an ample supply of cargo, but homewards from Bangkok, the supply fell short owing to the failure of the rice crop in 1912 diminishing the exports. However, the vessels were able to complete their homeward cargoes in other ports.

The Pacific Line.—This service, started in 1911, was continued with satisfactory results by means of the company's own tonnage combined with chartered steamers. It is the intention of the company to extend this service further after the opening of the Panama Canal.

In order to enable the company to provide for the transportation of cargo on its routes 28 steamers, aggregating about 170,000 tons dead weight, had to be chartered.

The company has up to the present time followed the practice of defraying all expenses for maintenance, repairs and classifications of its vessels out of its trading profit, and to write off for depreciation 5 per cent of the original cost value, whereby the total cost of a ship is written off in the course of 20 years. In view of the rapid development of naval architecture and the requirements of specially constructed vessels for service on the regular routes, it has now been decided to write off the ships in the course of 15 years. Corresponding amounts have been written off for the past year.

The Company's Fleet.

Name—	Year Built	Tons Gross Reg.	Tons D. W.	I.H.P.
S. S. "Arabien"	1911	4,714	8,720	2700
S. S. "King"	1911	4,714	8,720	2700
S. S. "Indien"	1902	5,199	7,400	2000
S. S. "Cathay"	1898	4,075	6,600	1600
S. S. "Tranquebar"	1906	3,453	6,000	1650
M. S. "Selandia"	1912	4,964	7,450	2500
M. S. "Jutlandia"	1912	4,874	7,600	2500
S. S. "Pangan"	1909	3,487	4,900	1600
S. S. "Chumpon"	1909	3,481	4,900	1600
S. S. "Bandon"	1909	3,485	4,900	1600
S. S. "Samui"	1907	2,861	4,500	1300
S. S. "Bintang"	1907	2,860	4,500	1300
S. S. "St. Croix"	1907	2,540	3,500	1350
S. S. "St. Thomas"	1907	2,487	3,500	1350
S. S. "St. Jan"	1907	2,478	3,500	1350
		54,672	87,490	

New Vessels Contracted for to Be Delivered in the Course of 1913 and 1914.

Name—	Tons. Gross. Reg.	Tons D. W.	I.H.P.
M. S. "Siam"	abt. 5,500	abt. 10,000	3300
M. S. "Malakka"	" 5,500	" 10,000	3300
M. S. "Annam"	" 5,500	" 10,000	3300
M. S. "Tongking"	" 5,500	" 10,000	3300
M. S. "Fionia"	" 5,000	" 7,000	4100
M. S. "Falstria"	" 4,500	" 7,000	2500
M. S. "Lalandia"	" 4,500	" 7,000	2500
S. S. "Natal"	" 4,000	" 7,000	1600
S. S. "Transvaal"	" 4,000	" 7,000	1600
S. S. "Rhodesia"	" 4,000	" 7,000	1600
	abt. 48,000	abt. 82,000	

Appendix.

The report for 1911 contained an appendix stating the reasons which prompted the company to build motor vessels for ocean service. In view of the extension of the company's tonnage, more especially by motor vessels, as dealt with in the present report, it will be of interest to supplement the statement of 1911 as referred to above.

If the M. S. Selandia and Jutlandia had been fitted with steam engines with corresponding power to that of their Diesel oil engines, their coal consumption would have averaged about 40 tons in 24 hours, whereas the oil consumption on their maiden voyages averaged 9 tons per 24 hours, and has since been gradually reduced to 8 tons. The design of the Diesel engines in the motor vessels now building to the order of the company has been improved and a further reduction in the oil consumption is expected.

Owing to the high temperature prevailing in the stoke holds of steamers in the Tropics, particularly in the Red Sea, difficulties are usually experienced—and often with a greater consumption of coal—in keeping up normal steam on the boilers, followed by decrease in speed. In motor ships these circumstances are reversed. The thick oil used for the Diesel engine becomes thinner under the influence of the tropical heat. This improves the automatic injection whereby the consumption of oil is reduced while the speed increases.

One advantage in the Diesel marine engine as compared with the marine steam engine is that one or more of the cylinders, all of which work independently of each other, can in case of need be instantaneously disconnected without the stoppage of the engines for that purpose. There have been no difficulties in the tropics in keeping the engines cooled by means of sea or river water. A steamship, especially after a stay of several days in port, requires from 12 to 14 hours for raising steam and making the engines ready to start, whereas the marine oil engine is ready to start at a few minutes' notice.

The marine boiler, including the piping, etc., is a source of considerable expenditure for maintenance. The boilers, when a steamship grows older, are its weak point, and usually require extensive repairs and renewals. The same applies to those parts of the vessel surrounding the boiler space, such as the bottom and sides of the ship, which are comparatively soon affected by corrosion caused by the heat radiating from the boilers as well as by the moisture contained in the coals, thereby affecting the vessel's sides in places where coal is bunkered. This drawback is dispensed with in motor vessels, where no boilers are required. The bottom tanks, which in a steamship are generally used for ballast, usually sea water, causing corrosion, are in motor vesse's employed for storing fuel oil which prevents corrosion, a fact of special importance in places difficult of access for general maintenance.

The bedplates and fixed parts of the Diesel marine engine are heavier than the corresponding parts in the marine steam engine and just as durable. The Diesel marine engine has less internal working parts and is therefore less complicated than a marine steam engine. The external working parts of the motor are just as strong as the corresponding parts of an ordinary marine steam engine. The "Selandia," which was completed under difficult circumstances in the middle of a severe winter, has suffered from fewer initial difficulties and troubles than several of the company's steamships during their maiden voyages. The minor shortcomings, for instance, in regard to the exhaust valves have been remedied, and the experience gained has been taken advantage of in the design of the later motors.

Judging by the data to hand it would appear that the fixed as well as the working parts of the Diesel marine engine have as long a life as those of the marine steam engine, and also that repairs and renewals to its working parts will not exceed those to the corresponding parts of the steam engine.

The smaller weight of the Diesel engine and the fuel oil carried in motor vessels, as compared with the weight of the engine and coal in steamships, has resulted in larger freight receipts owing to increased carrying capacity, and to this must be added the considerable advantage that has accrued from motor vessels being able to cross the river bar at Bangkok, inwards as well as outwards, with a larger quantity of cargo which would otherwise have had to be lightered.

Not only has the loss of time generally involved in coaling been avoided, but also the maintenance

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of the ships has been reduced and savings effected in respect of painting, etc., etc.

The results attained by the Selandia have increased the interest in the marine Diesel engine, and, more particularly in England and Germany, ships are under construction for propulsion by Diesel oil engines of various designs, notably engines of the 2-cycle description. The engines in the motor vessels of the "Selandia" type as well as in the motor vessels building to the order of the company, are of the 4-cycle description, but while the engines of the "Selandia" have 16 cylinders, developing 2,500 i. h. p., the engines of the ships now building have only 12 cylinders, occupying less space but developing greater power. Thus the 12 cylinders of the "Fionia," now in course of construction, will be capable of developing 4,100 i. h. p. The engines of the 2-cycle type occupy less space than those of the 4-cycle description, but the consumption of oil, as far as can be ascertained at present, is greater.

The development in the building of motor vessels for the merchant marine depends chiefly on the supply of oil. In this respect motor ships are, at present, limited to routes where oil can be obtained on terms that will enable it to compete with coal. The use of the Diesel motors for marine propulsion is for the time being confined to vessels of a certain size and speed.

Report for 1913.

In order to compete adequately with the traffic on its various routes, the company has again had to employ a large number of chartered vessels, without gaining direct advantage, as the strong freight market, more particularly in the first half of the year, brought in its train increased cost of chartering, which was not counterbalanced by a corresponding rise in tariff rates, as these do not follow the fluctuations of the general freight market.

Shipping Department.—This on the whole has worked under favorable conditions, and in particular the increase of the company's own trading has caused a corresponding increase in the transport of goods. The fleet was increased, in April and June respectively, by two new motor vessels, viz.: the "Siam" and the "Annam," having a total carrying capacity of about 20,000 tons. Two steamers, the "San Jan" and the "St. Thomas," with a total carrying capacity of 7,000 tons, have been sold, in accordance with the company's renewal policy, as outlined in the report for 1912.

The company's motor ships have worked satisfactorily in every respect, amply fulfilling the hopes expressed in the appendix to the two last yearly reports, and they have realized considerably larger net profit, as compared with the steamers.

As regards the conversions and new constructions mentioned in the report for 1912, it is expected that Diesel motors will be installed in April, May and June in the steamers "Bandon," "Chumpon" and "Pangan" respectively, the steam engines for these vessels being fitted into the Transvaal, Rhodesia and Natal, which are expected to be completed in March, May and June. The motor ships "Fionia," "Falstra," "Lalandia," "Malakka" and "Tongking" are expected to be ready for service in March, May, June, August and September respectively.

In view of the success of Diesel motors the company has decided to build a sailing ship of a little more than 5,000 tons dead weight, with a large spread of canvas, giving her a fair speed in the wind zones, and also fitted with an auxiliary screw, driven by a Diesel motor of about 600 h. p., which will give the ship a speed of about 7 knots in calm weather, and so carry her through the calm and variable zones. This ship will in time supply the company's motor and steam vessels with officers and men all trained under conditions which are nowadays difficult to attain.

As appears from the balance sheet, the company has ample funds available to meet the payments on account of the above-mentioned ships now in course of construction.

The Siam Line.—Cargo has been ample both outwards and homewards, and results have been very satisfactory. An attempt has been made to increase the passenger traffic on the Bangkok route by means of the new motor vessels, and, without involving any decrease in the loading capacity of these ships the main and bridge decks have been fitted with first-class passenger accommodation, which in every respect equals that provided for travelers by other Eastern lines.

In all thirty outside steamers have been chartered for the various routes, with a total loading capacity of about 190,000 tons.

The Company's Fleet, as at December 31st, 1913.

Name—	Year Built	Tons Gross Reg.	Tons D. W.	I.H.P.
S. S. "Cathay"	1898	4,075	6,600	1600
S. S. "Indien"	1902	4,199	7,400	2000
S. S. "Tranquebar"	1906	3,453	6,800	1650
S. S. "Arabien"	1911	4,714	8,720	2700
S. S. "Kina"	1911	4,714	8,720	2700
M. S. "Annam"	1913	5,295	9,940	3300
M. S. "Siam"	1913	5,295	9,940	3300
S. S. "Bandon"	1909	3,485	4,900	1600
S. S. "Chumpon"	1909	3,481	4,900	1600
S. S. "Pangan"	1909	3,487	4,900	1600
M. S. "Selandia"	1912	4,964	7,450	2500
M. S. "Jutlandia"	1912	4,874	7,600	2500
S. S. "St. Croix"	1907	2,540	3,500	1350
S. S. "Samui"	1907	2,861	4,500	1300
S. S. "Bintang"	1907	2,860	4,500	1300
		60,297	100,370	

New Vessels Contracted for, to Be Delivered During 1914 and 1915.

Name—	Tons Gross Reg.	Tons D. W.	I.H.P.
M. S. "Malakka"	abt. 5,500	abt. 10,000	3300
M. S. "Tongking"	" 5,500	" 10,000	3300
M. S. "Fionia"	" 5,000	" 7,000	4100
M. S. "Falstria"	" 4,500	" 7,000	2500
M. S. "Lalandia"	" 4,500	" 7,000	2500
S. S. "Transvaal"	" 4,000	" 7,000	1600
S. S. "Rhodesia"	" 4,000	" 7,000	1600
S. S. "Natal"	" 4,000	" 7,000	1600
Sailing ship with Diesel Motor		" 5,000	600
	abt. 37,000	abt. 67,000	

Depreciation on the value of ships has been calculated, as was the case in the previous year, on the basis of a 15 years' amortization.

Report for 1914.

During the year the company's fleet has been increased by three new motor ships having a total carrying capacity of about 27,000 tons, viz.: "Fionia," "Malakka" and "Tongking," delivered in March, September and October respectively, also three new steamers with a total carrying capacity of about 22,000 tons, viz.: Transvaal, Rhodesia and Natal, which were put into service in April, June and July respectively. In addition the Bandon was put on the Bangkok Line in November, after having Diesel motors substituted for steam engines.

Towards the end of the year the company purchased a coast motor ship with a carrying capacity of about 600 tons and a combined sail and motor ship of about 500 tons, both for the West Indian coast service.

The company much regrets that the above-mentioned motor ship Malakka on her first voyage homeward from San Francisco to Copenhagen, stranded on Cerros Island, south of California, on December 18. She has since become a total wreck and been abandoned. The ship was fully insured.

The average age of the ships now in service is 4.12 years and the average price £8 8s. 9d. per ton d. w.

The motor ships have fulfilled all expectations indicated in previous reports.

In order to keep the development of the shipping and trading interests as far as possible on a level basis, and with a view to principally employing its own ships on the various routes, the company has contracted during the past year with Messrs. Burmeister & Wein, Maskin and Skibsbyggeri for the building of four new motor ships of the "Siam" class, each having a carrying capacity of about 10,000 tons. The vessels will be named "Panama," "Australien," "Columbia" and "Chile," and are expected to be ready for delivery in March, July, September and December, 1915, respectively.

With regard to some of the new ships under construction, referred to in the report of 1913, the company has been disappointed in respect to delivery. The two new motor ships "Falstria" and Lalandia have been delayed about ten months and are now only expected to be delivered in February and March, 1915, respectively. The motor ships "Bandon," "Pangan" and "Chumpion" were delayed six months beyond the time mentioned in last report.

The five masted sailing ship mentioned in the report for 1913 will be named "Kobenhaven" and expected to be delivered in the summer of 1915.

The company has utilized 24 chartered steamers on the various routes, having a total carrying capacity of about 170,000 tons. Apart from the influence of the war on the route service, previously mentioned, the war has occasioned a large amount of extra work, and it has frequently been necessary to divert the ships from one route to another.

The Company's Fleet, as at December 31st, 1914.

Name—	Year Built	Tons Gross Reg.	Tons D. W.	I.H.P.
S. S. "Cathay"	1898	4,075	6,600	1600
S. S. "Indien"	1902	4,199	7,400	2000
S. S. "Tranquebar"	1906	3,453	6,800	1650
S. S. "Bintang"	1907	2,860	4,500	1300
S. S. "Samui"	1907	2,861	4,500	1300
S. S. "St. Croix"	1907	2,540	3,500	1350
M. S. "Bandon"	1909	3,485	4,900	1600
M. S. "Chumpon"	1909	3,481	4,900	1600
M. S. "Pangan"	1909	3,487	4,900	1600
S. S. "Arabien"	1911	4,714	8,720	2700
S. S. "Kina"	1911	4,714	8,720	2700
M. S. "Selandia"	1912	4,964	7,450	2500
M. S. "Jutlandia"	1912	4,874	7,600	2500
M. S. "Annam"	1913	5,295	9,940	3300
M. S. "Siam"	1913	5,295	9,940	3300
M. S. "Fionia"	1914	5,218	6,820	4100
M. S. "Tongking"	1914	5,229	9,812	3300
S. S. "Rhodesia"	1914	4,112	7,250	1600
S. S. "Natal"	1914	4,170	7,350	1600
S. S. "Transvaal"	1914	4,400	7,440	1600
M. S. "Anholt"	1913	255	380	200
M. S. "Samso"	1914	387	545	160
		84,068	139,967	

New Vessels Contracted for, to Be Delivered During 1915.

Name—	Tons Gross Reg.	Tons D. W.	I.H.P.
M. S. "Falstria"	abt. 4,500	abt. 7,000	2500
M. S. "Lalandia"	" 4,500	" 7,000	2500
Five-masted sailing ship with Diesel motor "Kobenhavn"	" 3,845	" 5,800	600
M. S. "Panama"	" 5,300	" 9,812	3300
M. S. "Australien"	" 5,300	" 9,812	3300
M. S. "Columbia"	" 5,800	" 10,400	3300
M. S. "Chile"	" 5,800	" 10,400	3300
M. S. "Laeso"	" 800	" 700	350
M. S. "Sejro"	" 800	" 700	350
	abt. 36,645	abt. 61,624	

Finance.—Neither in Denmark nor in any foreign countries has the company taken advantage of the right to postpone payments under the term of the moratorium proclamation of August 20, 1914; on the other hand, the company has suffered practically no inconvenience from the moratoria conditions operating in other countries.

Report for 1915.

During the past year the company's fleet was augmented by five new motor ships, viz.: Falstria, Panama, Australien, Columbia and Chile, having a total carrying capacity of 47,424 tons. In accordance with the company's general principles, viz., as far as possible to maintain its fleet on a level with modern developments, it was decided in future principally to employ motor ships on the overseas routes. The confidence placed in this new motor propulsion as set out in the reports for 1910 to 1914 has not been shaken. Since then Messrs. Burmeister & Wain, Limited, have succeeded in further improving their Diesel motors both in regard to perfect working and reduction of oil consumption. **About the middle of the year the company decided to dispose of all its steamers.** The steamships "Samui" and "Bintang" were sold to Norway, whereas the steamships "Indien," "Tranquebar," "St. Croix," "Kina," "Arabien," "Rhodesia," "Natal and Transvaal" were to be transferred to the newly formed Danish Steamship Company, Orient, Limited, as they returned from their current voyages, but in compliance with the agreement between the two companies these steamers are until further notice to continue to serve the East Asiatic Company's routes for account of the Steamship Company Orient, Limited. Further, the company has sold to Norway, for later delivery, its three smallest single screw motor ships "Bandon," "Chumpon" and "Pangan," of a total carrying capacity of 14,700 tons.

On the other hand the company has ordered from Messrs. Burmeister & Wain, Limited, 20 twin-screw motor ships of a total carrying capacity of ab. 230,000 tons, viz., 8 vessels of ab. 10,400 tons, 6 of ab. 11,800 tons, and 6 of ab. 12,800 tons each, with a total i. h. p. of 86,400, viz., 2 vessels of 3,300, 12 of 4,000, and 6 of 5,300 i. h. p. each. The average speed of these vessels will be respectively 11½, 12 and 13 knots. The 12 largest ships will be fitted with refrigerated accommodation for conveyance of fruit. Further, the company has ordered from the A. S. Frederikshavns Vaerft & Flydedok (Frederikshavn's Shipbuilding & Floating Dock company, Limited) 2 motor vessels of 700 tons each.

On the 5th of May the company's oldest steamship, the "Cathay," was destroyed off the English coast by an explosion from some outside source, which has not been ascertained, yet, happily, without loss of, or injury to, any of the passengers or crew. Including the lost "Cathay," but excluding the 3 motorships, the company's fleet has decreased by 11 ships having a total carrying capacity of 72,780 tons, against which 23 ships

(Continued on Page 23.)

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Will the Future Double-Acting Engine Be the Marine Diesel?

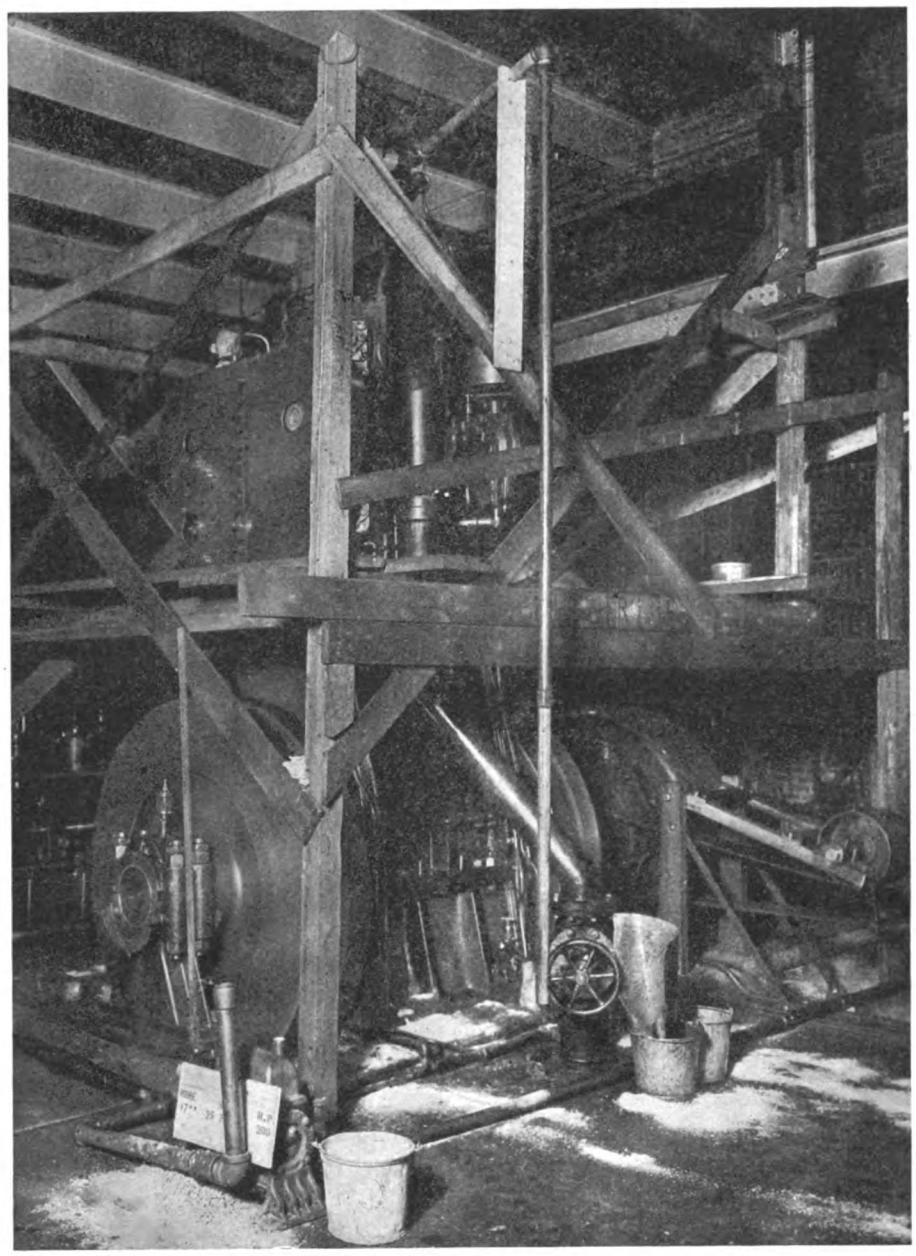
This is a question that has been occupying the minds of marine engineers and shipowners for a good many years, and is one that still remains unanswered, and is likely to remain more or less indefinite for several more years to come, which fact does not rob the subject of any of its importance. Should the double-acting marine Diesel engine be successfully produced in high powers—there hardly will be any demand in small powers—it will be another severe blow to steam machinery. By the term "a successful engine," we do not mean merely favorable shop trials; but ability to stand the rough usage of mercantile marine operation under all ordinary ocean-going conditions.

At present the maximum power per shaft in which confidence can be placed of single-acting Diesels, is under 2,500 b. h. p, or the equivalent to say, about 3,000 steam indicated horse-power so that the size and speed of a motorship is somewhat limited at present. In fact, the man who ordered today a triple-screw motorship of equivalent total power to 10,000 i. h. p. in steam would be taking quite a gamble, and we believe extremely few shipbuilders would undertake the job. The advisable maximum today would be about 7,000 steam i. h. p., although the "Maumee's" two motors have developed in aggregate 6,100 b. h. p. at 140 r. p. m. on the brake-test, or equivalent to about 7,500 steam i. h. p. Now with a double-acting engine the percentage of power is considerably increased, with the additional advantage of the weight and space required only being slightly greater than that of a single-acting motor of about half the power, so that the speed, or size, of a ship could be augmented to an important degree. This would make the internal-combustion-engine possible for medium sized passenger and mail ships of 14-16 knots speed. With these facts before us it would seem that such builders as have attained absolute reliability with high-powered single-acting motors, should turn their attention to making designs of such sizes as they already have developed into double acting sets. By so doing they will increase the available power without increasing the cylinder diameter; and it is with every additional inch bore that the heat problems increase.

With four-cycle engines of up to about 30 inches cylinder diameter, all troubles seem to have been overcome by certain of the European builders. Such an engine in six-cylinders would give about 2,000 h. p. or the equivalent to almost 2,500 steam i. h. p. Re-designed to the double-acting principle about 4,750 steam i. h. p. should be obtained per engine, or 9,500 i. h. p. for a twin-screw ship, or 13,250 i. h. p. if triple-screw. It is not advisable to increase the number of cylinders per engine; but in an extreme case they could be increased to eight without harm, which then would furnish a total of nearly 18,000 steam i. h. p. with most reasonable space weights and at a propeller speed of about 100 r. p. m.

But, the adoption of the double-acting principle involves many obstinate problems of engineering not yet fully overcome so far as its application to the marine Diesel type crude oil engine is concerned. One great advantage when applied to the two-cycle Diesel is that relief is given to the incessant grinding on the main bearings, so that lubrication thereby will be faciliated, for the pressures are evenly distributed over both the upper and lower halves, instead of solely and continuously on the lower halves. Generally speaking operations of such large two-cycle Diesel ships as are in service tend to indicate that if the two-cycle motor ultimately becomes the principal marine engine it will be of the double-acting type; but first of all the double-acting four-cycle engine may have to be produced and perfected. To a great extent the huge expense of experimenting and developing will have to be borne by shipbuilders, especially in America where ship owners seem strangely adverse to making appropriations towards developing what must ultimately result to their advantage. There are many American ship owners today making millions of dollars profit, and it would be a splendid thing for the industry if one, or more, would boldly come forward and give a few hundred thousand dollars towards developing the marine Diesel-type oil engine under both shop and sea-going conditions.

Among the best known of German shipbuilders are Blohm & Voss of Hamburg, who have a reputation for marine engineering in its highest degree, the standard of work turned out by them being consistent to the proper requirements of



EXPERIMENTAL ENGINE OF THE DOUBLE-ACTING PRINCIPLE, BUILT BY NEW LONDON SHIP & ENGINE CO.

ships' machinery. This firm became associated in Diesel construction with the M. A. N. some years ago and since have been responsible for considerable oil engine development. They have throughout shown a patience and cautiousness under almost disheartening circumstances that perhaps only German character could contain.

We refer to the years of labor put by them into developing two 850 b. h. p. marine double-acting two-cycle type Diesel engines under the guidance of their chief engineer, Dr. Rieppel, who is a man of undoubted ability.

It was seven years ago, if we recollect rightly, that the Hamburg-American Line ordered the motorship that was to have these engines. It was a few weeks before the war commenced that Blohm & Voss were so satisfied with progress made to the extent that they were just about to install the engines in a new hull built for them, the original hull already being in service with steam machinery. Whether these engines have been installed in the merchant ship, or whether they have been used for naval purposes will hardly be revealed before the termination of hostilities.

Expense in the production of these, and other Blohm & Voss motorship engines evidently occupied a very minor position in the considerations of construction, and were built with little regard to any financial aspect, the chief thought being the obtaining of a degree of reliability and efficiency as near perfection as is possible. We understand that these two engines in reality, were a second set for the same ship, the two original engines having been built by the M. A. N. and by Blohm & Voss respectively, without any definite intention of trying them out at sea; but just for shop experiments.

It is indeed unfortunate for the development of the double-acting Diesel that war should have robbed the world of the results of these years of labor, for Blohm & Voss never let a production leave their yards unless they have a deeply-rooted conviction and a large measure of confidence in the results. Every precaution that foresight could suggest had been taken, although the designers fully realized that shop tests have limits and that sea trials may reveal minor faults of design and construction, and conceivably a few difficulties of greater or less magnitude.

Apparently the stuffing-box problem had been overcome, and it is the stuffing-box problem that many other engineers have feared, because of the intense heat to which it and the piston-rod are subjected with the double-acting principle. The original pair of engines were subjected to extraordinary harsh treatment, and as far as was possible were made to undergo the cruelty of both abnormal and intermittent temperatures, varying these with normal temperatures, and below normal temperatures, such as occur when a ship is laboring in heavy weather. The experience with these first experimental sets must have afforded them exceedingly valuable knowledge for the construction of the second set, and it was a splendid thing, perhaps, that they did not install the first pair in a ship; but wisely waited until the proper pair were ready. The cost to them, of course, must have been enormous, and one cannot but admire the indomitable fortitude and courage that carried them through five years of disappointments to what seemed like eventual success. When peace reigns once more, maybe the world will know if their labors were crowned with the complete success that they undoubtedly deserve. If they have perfected the two-cycle type of double-acting marine Diesel crude-oil engine, the motorship of 10,000 to 20,000 tons has a most rosy future, for the movement to larger sizes would quickly be undertaken. T. O. L.

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AVANCE ENGINE MAKES EXCELLENT RECORD.

The tug P. R. T. No. 1 which graces our front cover is now in Seattle to demonstrate the Avance oil engine.

After having been in commission since June, 1914, the inspection of this engine December 23 was most interesting. A Motorship representative having the opportunity of seeing the cylinder heads removed, the pistons drawn and a further close examination of the big ends and main bearings.

The Avance is a two cycle engine of the hot bulb type and which uses a fresh water injection with the fuel.

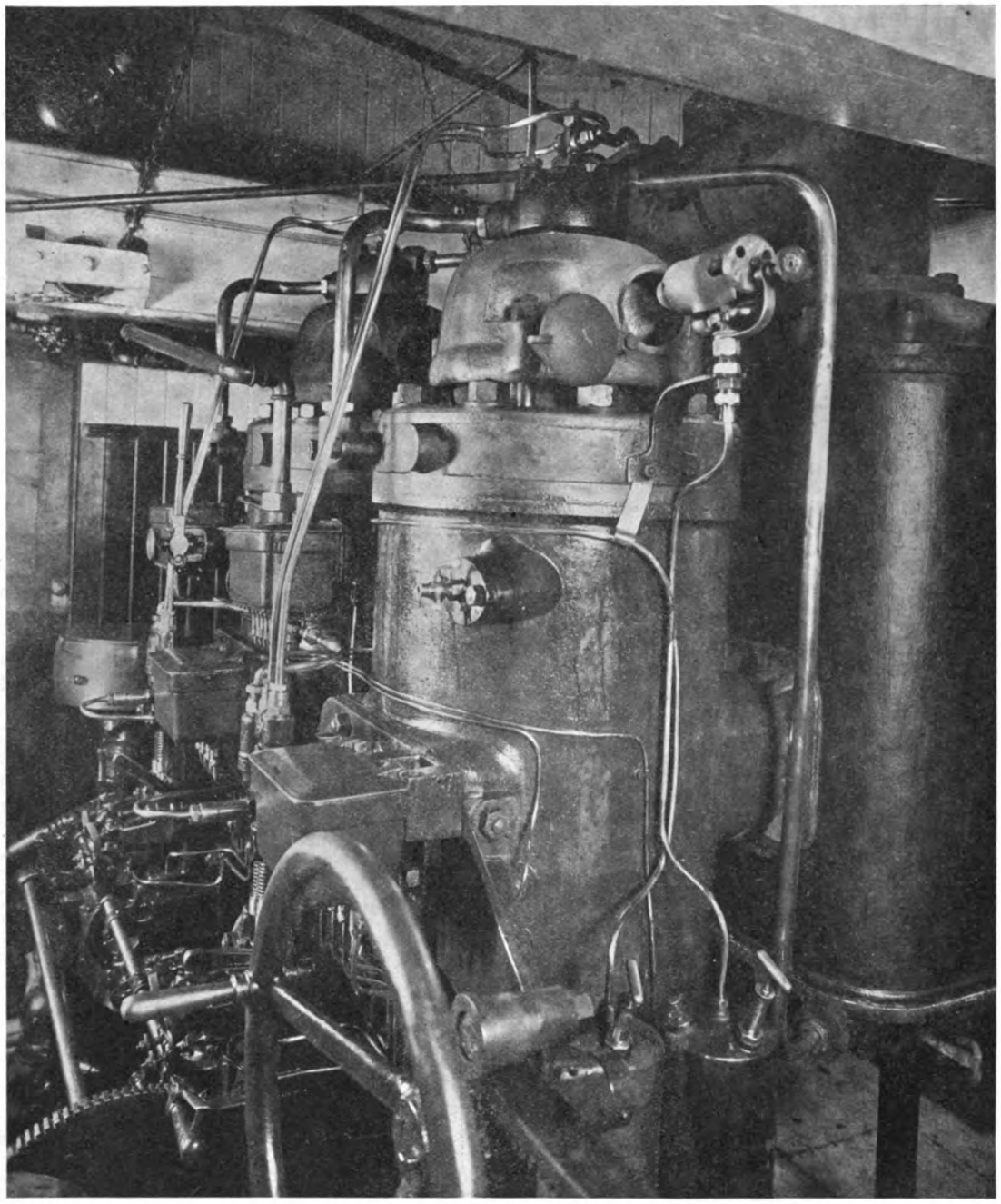
After 18 months of consistent work the cylinders are in perfect condition.

The owner states that the big ends and main bearings have never been taken up and yet there is no looseness or knock.

The engine is rated at 100 b. h. p. at 240 r. p. m. in 2 cylinders of 14 9-16 bore and 14 15-16 stroke.

The consumption of fuel is 6½ American gallons of Calol, 24 gravity, and lubricating oil ¼ gallon per hour.

P. R. T. No. 1 was built at Prince Rupert from designs by Edson B. Shock of Seattle, in the spring of 1914 by H. Johnston. She is 65 feet over all by 15 feet beam outside of guards, with a draft of 8 feet, using a bronze three bladed reversible propeller manufactured by the Avance Company. She is owned by the Prince Rupert Towing Company of Prince Rupert, British Columbia, managed by J. H. Johnson, who also handles the B. C. Avance oil engine, the Seattle representative being the Woodhouse Gasoline Engine Co., 62 Marion street.



AVANCE HOT BULB ENGINE, 100 b. h. p., INSTALLED IN "P. R. T. No. 1"

M. S. "CHACO."

This interesting little vessel has been in commission since July last, operating day and night between Seattle and Puget Sound ports.

She was built in the spring of 1916 by Martin Olich of Quartermaster Harbor, Tacoma. Her dimensions are 64 feet 11½ inches in length over all, beam 22 feet 6 inches, extreme draft loaded, 5 feet, with a cargo capacity of 60 tons.

The power equipment consists of a 75 b. h. p. 6 cylinder four cycle Winton, which swings a three bladed 42x38 wheel 325 revs., giving the vessel a speed of from 7 to 7½ miles per hour according to weather conditions.

The owners state that her averaged consumption of distillate is 5¼ gallons per hour for 400 hours.

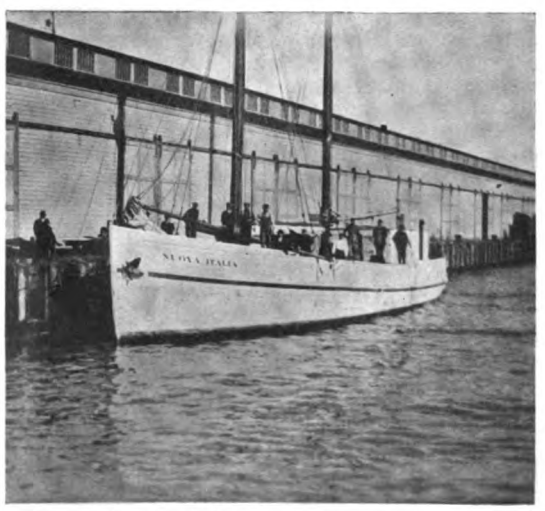
The winch used for handling the cargo is geared direct from the engine.

Coming just within 65 feet she escapes the government requirements of a full crew. The engine being under the care of the captain and operated from the pilot house. "Chaco' 'is owned by the Island Transportation Company at Pier 3, Seattle, of which James D. Efary is president, H. B. Lovejoy, manager, while Capt. F. E. Lovejoy, son of H. B., with the assistance of two deck hands, constitutes the entire crew of this husky little freighter.

M. S. "CHACO," OPERATED BY ISLAND TRANSPORTATION CO., ON PUGET SOUND

"NUOVA ITALIA" SAILS.

The power schooner "Nuova Italia," recently launched by Schultze & Schultze, sailed for Callao, her home port, December 11. On her trial trip up to Oleum, a few days before, her 125 h. p. Skandia engine gave her a speed of 8½ miles per hour. She is practically a duplicate of the "Terza Italia," built last spring and now giving satisfactory service along the Peruvian coast.



AUXILIARY SCHOONER "NUOVA ITALIA"

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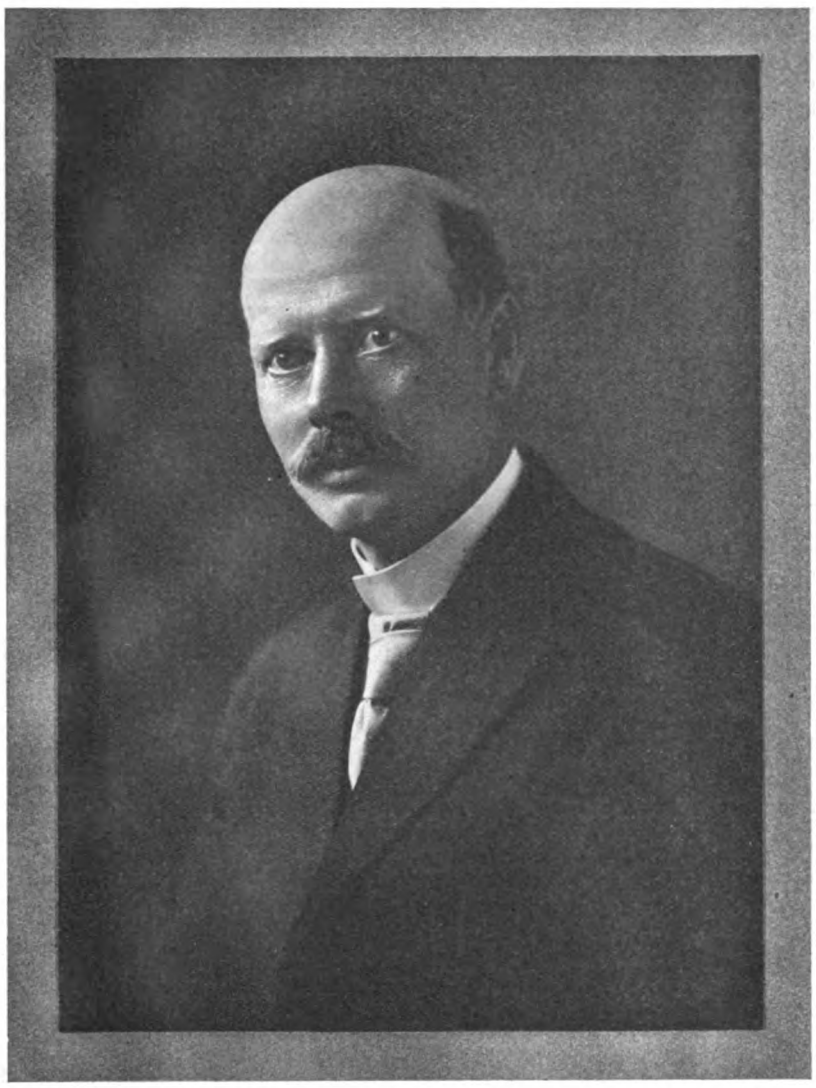
The Designer of the Atlas Diesel

The new Atlas Diesel engine is built on designs worked out by Axel Warenskjold, head of the Atlas-Imperial Engine company, who has contributed so greatly to the development of the internal-combustion engine on the Pacific coast.

Mr. Warenskjold is a native of Norway, where he received a thorough education as a mechanical engineer. The most valuable part of his training, he says, was received from his father, who was an engineer in the service of the Norwegian government, and at one time a large ship owner of Christiania. The careful and highly practical training thus received, he says, has proven of the greatest usefulness in his subsequent work, and is at the foundation of the results achieved in recent years.

Coming to Chicago as a young man in 1882, Mr. Warenskjold started at once to learn the machinist trade from the bottom up. Completing his apprenticeship, he came to California in 1886, taking a position as master mechanic for the California Wire Works of San Francisco, then the largest manufacturing industry on the coast except the Union Iron Works. Leaving here in 1887, he went to San Diego to install the mechanical equipment of the Hotel Coronado, then under construction, which was for years the most elaborately equipped hotel on the coast. Completing this work successfully, he started in business at San Diego, handling, among other lines of machinery, the old Hercules gas engine, which had been on the market but a short time.

At this time he began to take a keen interest in the possibilities of the internal-combustion engine, and his practical ideas on gas engine design began to attract attention. In 1894 he accepted a position as designer and superintendent of the old Hercules gas engine works, and moved to San Francisco. Few marine gas engines had been installed up to that time, but Mr. Warenskjold soon brought the marine as well as the stationary engine to a state of considerable efficiency, and the engines gradually gained a wide popularity for the smaller types of vessels. During the ten years that he spent with the Hercules plant, the gasoline engine practically replaced all other forms of power for bay towing, light freight and passenger service, and small fishing boats, and some very successful installations were made in vessels of a larger type.



AXEL WARENSKJOLD

In 1904 Mr. Warenskjold started in business for himself in San Francisco, organizing the Atlas Gas Engine company, which had its shop at First and Howard streets. This early plant was burned out in the great fire of 1906, after which a large factory was built on the waterfront in East Oakland. During these years the business grew with great rapidity, and after a short time the new plant was outgrown, and a larger building was erected on the present site, near the foot of Twenty-third avenue, Oakland. The increasing reputation of the product for efficiency and reliability brought continued expansion, and now, with the absorption of the Imperial Gas Engine company, the plant is being enlarged to three times its present size.

Since starting in the gas engine business, Mr. Warenskjold has always been greatly interested in the idea of an internal-combustion engine that would handle the cheaper grades of fuel, such as California crude petroleum; and much of his attention has been given to the design and construction of experimental models of that nature. Though working entirely alone in this line, he soon discovered the general principles essential to success in this type of engine, and as much as twenty years ago built a single-cylinder engine in the Hercules plant that would handle crude oil in satisfactory shape, and is still giving good service. For various reasons, however, the crude-oil engine was not taken up commercially at that time, and experiments were gradually continued with the object of perfecting all details of the design for engines of various purposes.

The result of these years of experimentation is the new Atlas full-Diesel type crude oil engine, which is now offered with full confidence that it will meet the most exacting requirements. While other heavy-oil engines are being made on designs developed in other parts of the world, this is essentially a Pacific coast product. Practically none of the ideas involved have been borrowed from any other source, and all the essential features of the engine have been perfected through Mr. Warenskjold's original researches.

PROGRESS ON ATLAS-IMPERIAL PLANT.

The floor of the Atlas-Imperial Engine company's big new shop was completed early in December, and the crane runway and frame for the building are now about complete. This will when complete be the most substantially built machine shop in Oakland, and capable of handling the heaviest work. Most of the tools have now been moved over from the old San Francisco shop, and the enlargement of the office building has been completed, making a comfortable office from which an unobstructed view can be had over practically the whole shop. M. E. Wright has moved his headquarters from San Francisco to the new office.

A railroad is being built from the wharf to the Bay end of the crane runway, which will give it rail connection at both ends.

The Atlas-Imperial plant is already starting work on several of the new Atlas Diesels, and has more business in this line offered than can be taken. Orders were recently accepted for three of the 500 h. p. size, and the Diesel engines will be built in sizes from 110 to 1,200 h. p., the latter being in 6-cylinder or 8-cylinder units.

In the gas engine department, the company closes the year with unfilled orders on its books for over 5,000 h. p. in the aggregate, and more coming in all the time.

An item of no little importance is the introduction of the new model Atlas-Imperial fishing boat engine, in 6 h. p. size, which combines the most desirable features of both Atlas and Imperial engines, on which their great popularity among the fishermen has largely been based. The first of these engines are now complete and ready for shipment, and they promise to become one of the most popular engines of their type ever introduced, a large number having been already ordered. Among the orders taken are between 150 and 200 for installation in Alaska salmon boats for this season's fishing.

An idea of the extraordinary amount of marine oil engine business that there is to be obtained will be realized when it is mentioned that during the month of November-December, 1916, the Atlas Imperial Engine company received and accepted orders for six Diesel type engines, and over one hundred and fifty (150) marine distillate and gasolene engines in varying sizes up to 250 b. h. p.

GOVERNMENT REGULATIONS ON GAS BOATS.

Ferries have special regulations as to passengers and boatage, but under some conditions it is better to run a ferry under a regular steamboat license, inasmuch as the advantage in the ferry license is so small in comparison to the right to deviate from running between two stated points.

A ferry license permits smaller number of life boats.

Donkey boilers, such as are required for steam inspected vessels, to be placed between decks, are not required on motor vessels.

Gas boats, under 15 tons, carrying passengers for hire, no matter what length, are not inspected, and can carry passengers and freight without boatage, but have one man who is licensed with a special operator's license entitling him to navigate the boat and run the engine. If the boat is under 65 feet in length, one operator is the only licensed man required. Gas boats engaged in passenger service over 15 tons and over 65 feet, must have a regularly licensed master, and an engineer with a gas license, (a steam engineer cannot run). Vessel is subject to inspection in a general way, but as far as boatage is concerned, must indicate how many passengers they wish to carry, (inspectors cannot dictate this), and then boatage and life rafts must be placed the same as steam vessels. Boatage on inland waters, i. e. where vessel does not leave any shore a greater distance than three miles must be 10% of the number of the passengers and crew carried, and this 10% may be one-fourth boats, remainder three-fourths life rafts.

Inspectors have the right to revoke the license of an officer on an inspected motor vessel in the event he exceeds the safety limit (in their opinion) in carrying passengers, and this is the only prohibitive right they have.

A CLASSY GIG.

The "crew of the captain's gig" on the new tank steamer "Capto," recently launched by the Union Iron Works, will have reason to be proud of their boat, which is just being completed by G. W. Kneass. It is only an 18-ft. boat, but is finely built, with light oak frame and lap-strake cedar planking, all copper fastened, equipped with a folding spray-hood and fitted up like the old Government boats. The power is a 6 h. p. Loew-Victor engine, which is expected to give her a speed of about 7 miles per hour.

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Modern Methods in Wooden Ship Construction

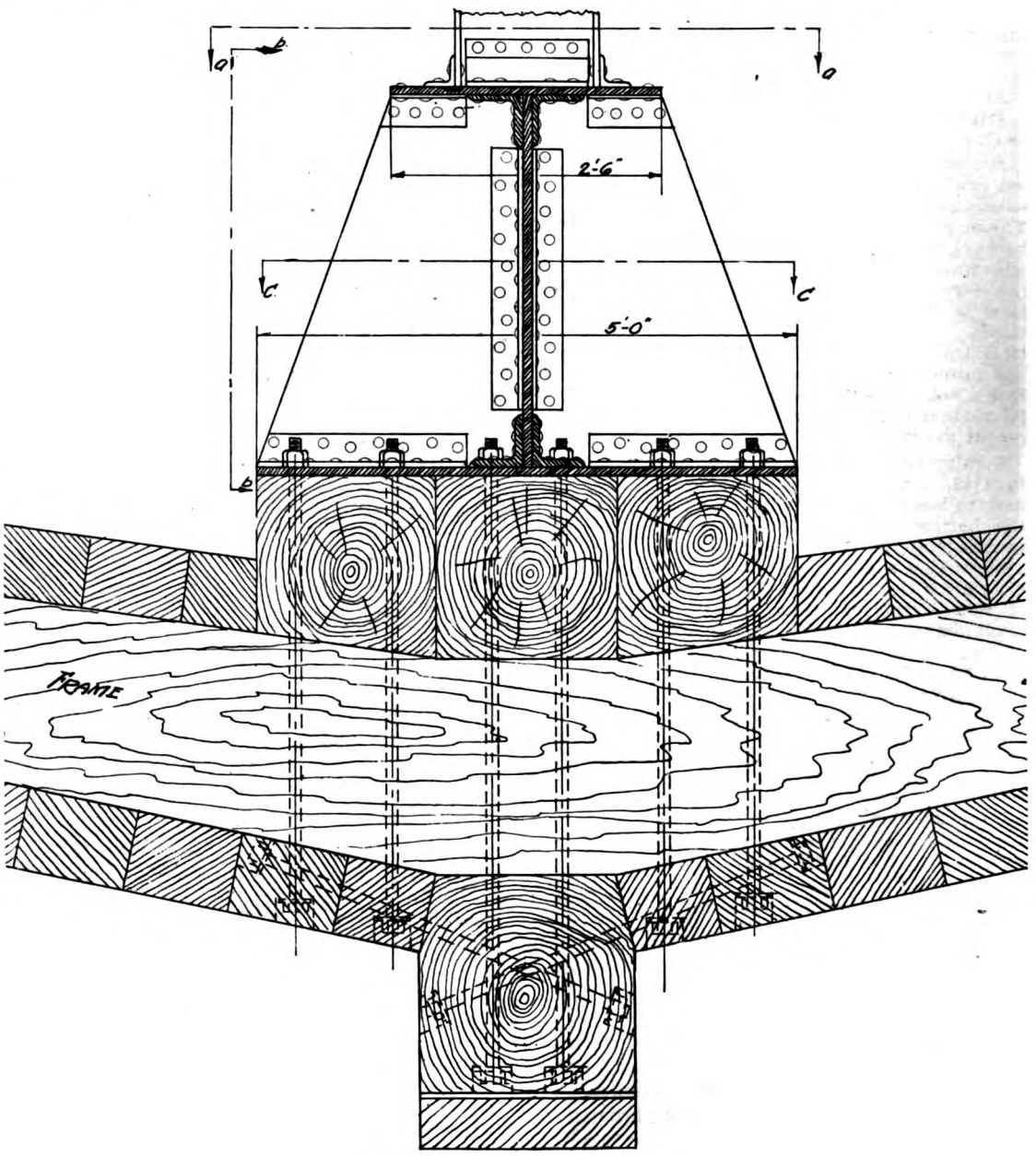
DONOHOE REINFORCED STEEL KEELSON.

Although steel has been previously used in the keelson construction of wooden vessels, it does not appear to have received serious attention from the numerous builders now erecting large wooden vessels on the Pacific coast.

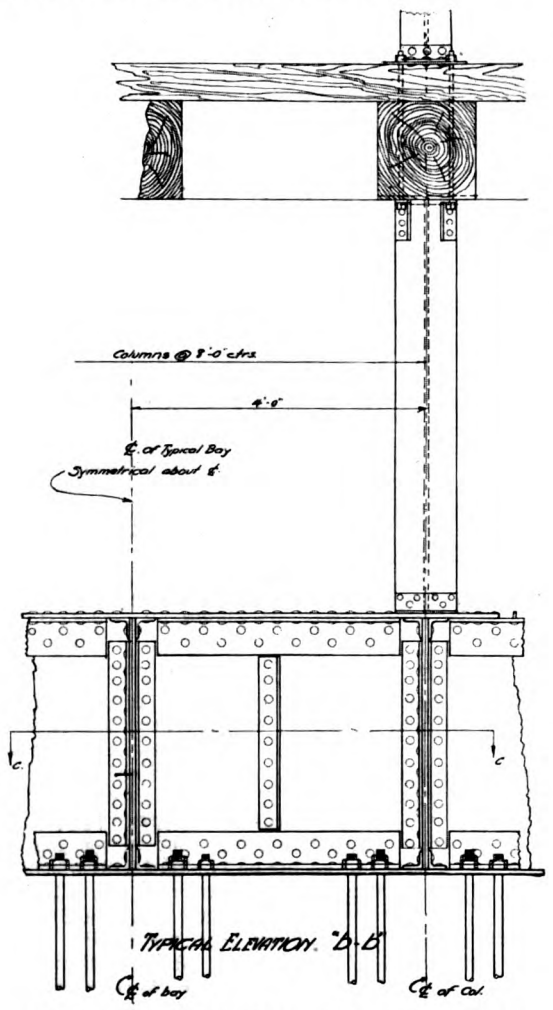
Patrick J. Donohoe, N. A. superintendent of the Washington Overseas Shipbuilding & Construction Co., has applied for patents upon a method of reinforcement with steel which he claims will revolutionize wood-hull construction, and further that a vessel so constructed of 250 feet in length gains almost 3,200 cubic feet in cargo space, at the same time being a stronger and more durable ship.

"There is no question," says Mr. Donohoe, "as to the advantages claimed, especially those of weight and space saved, and we would go farther and say time saved in erection, as this steel work could be assembled from templates and shipped knocked-down to the yards, the placing in position rivetting and bolting down being child's play in comparison with some of the heavy forms of keelson construction in use today."

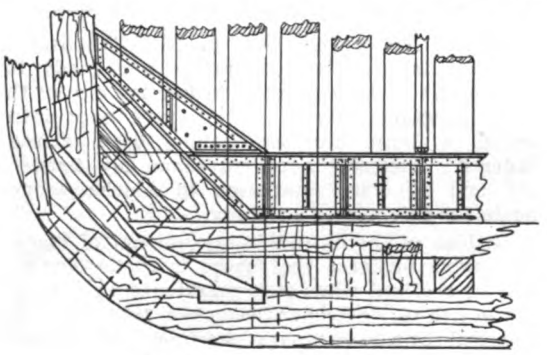
Donohoe's drawings are clear and self-explanatory and the principle is favorably looked upon by Lloyd's and other classification societies.



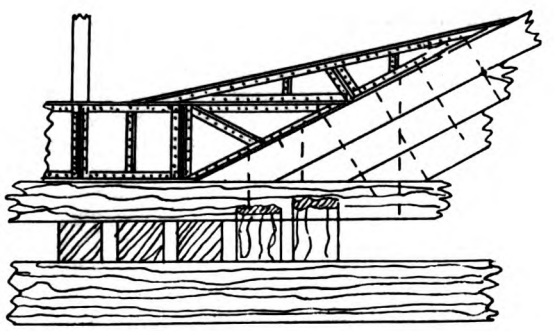
TYPICAL TRANSVERSE SECTION



ELEVATION SHOWING COLUMN AND 'TWEEN DECK



BOW REINFORCEMENT



STERN REINFORCEMENT

SHELL OIL DEVELOPMENT.

On several occasions recently we have referred to the extensive developments in America that could be expected in the future on the part of the "Shell" interests. Since our paragraphs have appeared we have heard that land has been acquired on Lulu Island adjoining Fraser River, and at Barnet, Burrard Inlet, where large refineries will be erected to handle the Western Canadian market.

Vancouver will be the supply center for this district. Crude-oil from the wells in California will be transported in bulk in the company's own steamers.

Incidentally it may be said that the Shell interests are firm supporters of the large motor tankship, so we should not be surprised to see some big Diesel-driven vessels placed in this service later on, which will afford the Shell people very low transportation costs. To a measure Mr. W. M. Smith of the Shell company, is responsible for this Western Canadian refinery, and it was Mr. Smith that introduced the internal combustion engine into China many years ago in connection with the same company's developments in that country.

LLOYDS AND LARGE MOTORSHIPS.

There are 46 large Diesel motorships holding the Lloyds' classification, while in course of construction under the survey of the Society are 30 sets of Diesel engines. This, of course, is less than one-tenth of the total number of motor vessels of substantial size now in service. In Russia alone there are in excess of 100 Diesel ships in operation.

STANDARD GAS ENGINE COMPANY.

The Standard Gas Engine company is rapidly getting the new building filled up, and is running two 12-hour shifts in order to build up a stock. The company reports more orders on hand than for four years past.

COOKSON & WALKER

An interesting announcement is a combination of experienced shipbuilders who have organized this company at San Pedro, Cal.

Both partners are old timers from the state of Maine, which was the cradle of master shipbuilders during the heydey of Eastern shipbuilding in wood. Both Cookson and Walker have designed and built a fleet of vessels around their present location too numerous to mention and their reputation is sound. C. D. Callahan, the well known San Pedro naval architect, while continuing his private practice, will attend to the designing and business administration end of the firm, whose office address is 207 Ferl Building, San Pedro, Cal.

Four motorships of 320 tons d. w. c. have been ordered from the Sjotorps Shipyard, Sweden, by the Reedereig Gevier, a well known Swedish ship owning company.

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Washington Overseas Shipbuilding & Construction Co.

PATRICK J. DONOHOE

The Washington Overseas Shipbuilding & Construction Co. has signed contracts for five wooden vessels of the fore and aft baldheaded auxiliary type ranging from 225 feet to 286 feet in overall length, all for Norwegian owners, and to be equipped with twin sets of Skandia engines in units ranging from 240 b. h. p. upwards. Donkey boilers and steam winches are to be used for deck auxiliaries.

Other contracts are at the disposal of this company if a reasonable time limit can be arranged, as the delivery on the first of the five vessels now contracted for dates from about August, 1917.

Lloyd's classification is called for. An interesting feature in the construction of these ships will be the Donohoe reinforced steel keelson, illustrated elsewhere in this issue.

The officials of this company are: A. R. Hunt of New York, president; John Sloan Barnes of Seattle, vice-president; Patrick J. Donohoe, N. A. superintendent, who graduated from the School of Art, Paisley, Scotland, in the year 1887.

After practicing at Paisley, Renfrew and Grennock, Donohoe migrated to New York in 1881, following which he opened offices in New Haven, Conn., and also Duluth, designing a number of steel steamers which were used on the Great Lakes.

During later years Donohoe has filled the position of consulting engineer to the State Ferry department, San Francisco, serving under the late Governor James H. Budd.

JOHN SLOAN BARNES

IMPROVEMENTS AT UNION PLANT.

Since the return from the East of W. L. Corson, chief engineer of the Union Gas Engine company, that concern has been making numerous improvements in its plant.

In addition to the manufacture of Diesel engines, which the company plans to undertake shortly, an entirely new line is that of aeroplane motors, for which there is a great demand. In connection with this, an elaborate testing outfit has been installed in the rear of the plant, and in the same building is a heat-treating furnace, the largest of the kind on the coast, where parts of the regular gas engines, as well as the aeroplane engines, are heat-treated to overcome internal stresses. The plant has been extremely busy, and has been running nearly 24 hours a day for some time.

The largest engine now under construction at the plant is a 200 h. p., 4-cylinder open-crosshead engine, to be installed at Portland in the schooner "Angelus' recently purchased there by the Merchants' Navigation company, of Los Angeles, for trade along the Mexican coast. This boat will also be equipped with a 9 h. p. Union hoist and winch, a 6 h. p. Union cargo hoist, and a 4 h. p. electric light outfit. The company is also building a 110 h. p. 3-cylinder engine for the Navy, to be installed in Alaska.

The Union company reports an exceptionally heavy foreign business. One of 80 h. p. was recently shipped to New Zealand; a 150 h. p. 3-cylinder engine has just left for Australia; a 60 h. p. and two 80 h. p. engines are ready for shipment to Tahiti, and one 80 h. p. to Guam; a 16 h. p. to Samoa, and two 25 h. p. engines to China. Practically all the Union engines are now being built with the hot-jacketed universal manifold, adapting them to run on kerosene without difficulty.

In addition to the Union engine business the company has quite a lot of business coming up in the Craig Diesels, which are rapidly gaining recognition on the coast.

SECOND UNITED ENGINEERING WORKS DIESEL.

The Union Iron Works is building a second Diesel engine on the model adopted by the United Engineering Works, which the former company bought out early in the year. The first engine of this model was installed on the ill-fated schooner S. G. "Mariscal," and was not in use long enough to be given a thorough demonstration. The new engine of 150 b. h. p., is to be installed in the old tug "Transit," for the use of the Union Iron Works around the Bay.

DOW MARINE DIESEL COMING.

The Dow Pump & Diesel Engine company, operating a large plant in Alameda, Cal., several years ago perfected a true Diesel type engine for stationary work, a number of which have been in successful operation—most conspicuously the one in the Merchants Ice & Cold Storage company's plant in San Francisco, one of the earlier installations, which has been running like a clock for a couple of years. For some time the company has been working to adapt this engine for marine use, which was comparatively simple, as the original model was of the vertical type, suitable for marine work, and the principal new feature needed was a practical reversing mechanism. It is understood that this has now been practically perfected, and that the company will have a true Diesel engine suitable for marine use on the market in the near future.

"CITY OF PORTLAND" ON RETURN TRIP.

The McCormick motor schooner "City of Portland," which reached Newcastle, Australia, Oct. 31, and has been waiting there since then for a cargo of coal, has found it impossible to get the cargo, owing to the present onerous shipping conditions in that country, and on December 10 started back for the Columbia river in ballast.

A NEW ALBICORE BOAT.

Castagnola & Beviacqua, at Fishermen's wharf, San Francisco, are building a fine San Pedro type tuna boat for use at San Diego. She is 42 by 11 ft., and about 4 ft. deep aft, with a 40 h. p. Frisco Standard engine. She is strongly built, with an Australian hardwood keel, 2½ in. bent oak and laurel frame, and 1½ in. Port Orford cedar planking. She has a brass shoe and fittings, and is fastened with extra heavy galvanized nails. In the forecastle forward, covered by a low cabin, she has comfortable accommodations for a crew of seven, and the engine, installed amidships, will be fitted with one-man control mechanism. She will be a good sea boat, and will make the trip from San Francisco to San Diego under her own power.

NORWEGIAN YARD TO BUILD MOTORSHIP.

A shipbuilding company has been established in Norway with a minimum capital of 200,000 kroners and a maximum capital of 400,000 kroners, and have purchased Colin Archer's old shipbuilding yard near Larvick. They will enlarge and modernize the shipyard for the purpose of building motorships of from 800 to 1,000 tons dead weight capacities.

VISIT OF ENGLISH SHIPBUILDER.

John T. Donohoe, managing superintendent of Fullerton & Sons, shipbuilders, Paisley, Scotland, recently visited Seattle on his way home from China and Japan.

Donohoe and his brother, Patrick J. Donohoe, general manager of the Washington Overseas Shipbuilding Co. of Seattle, had been separated for twenty-six years.

The scarcity of steel and skilled labor in Scotland will lead in all probability to Fullerton & Sons placing orders with the Washington Overseas Shipbuilding & Construction Co. for steel reinforced wooden vessels, upon the return of John T. Donohoe to Scotland.

MORE CROWLEY BOATS SOLD.

The Crowley Launch & Towboat company has sent the "Crowley No. 19" to San Pedro, having sold it to the city of Los Angeles, and the "No. 15" to the Pacific Products company of San Pedro, to be used in towing kelp barges. The "No. 14" has been sold to the Daniel Contracting company for use on San Francisco Bay. The Crowley company recently made a good purchase in picking up the old Government launch "Sternberg," which is sheathed and fastened throughout with copper. She also has a very fair steam engine. She is now laid up at the Crowley yard in Oakland, and it has not been decided what will be done with her. The boat was bought for $310.

BUILDING MOTOR LIFE BOATS.

John Twigg & Sons company are building two 24-ft. and one 28-ft. power life boats for the Matson Navigation company's steamers. They will be powered with small Union engines.

KNEASS BUILDING MANY BOATS.

G. W. Kneass of San Francisco, has at present over 180 boats under construction in his shops. Most of these are life boats of several standard designs, both wooden and metal, for steamers being built by the Union Iron Works, but there are also a number of Mexican coffee-lighters, and quite a number of Alaska salmon boats. One of the boats is a 20-ft. power tender for the steamer H. G. Folger. It is 6 ft. 3 in. beam, 2 ft. 8 in. deep, with a 4 h. p. Union engine. It is equipped as a life-boat, with air tanks, and the engine is enclosed in a water-tight compartment, covered with a substantial skylight, making the boat very seaworthy. It will accommodate 14 persons.

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Prominent New Ship Yard; Activities

COLUMBIA ENGINEERING CO.,

Linnton, Portland, Oregon.

Work at this new ship yard has progressed so rapidly that during a brief interval between visits made by a Motorship representative a veritable transformation had taken place, and the mushroom-like growth of the two vessels in course of construction was truly an eye-opener, together with the huge shelter sheds protecting their entire length.

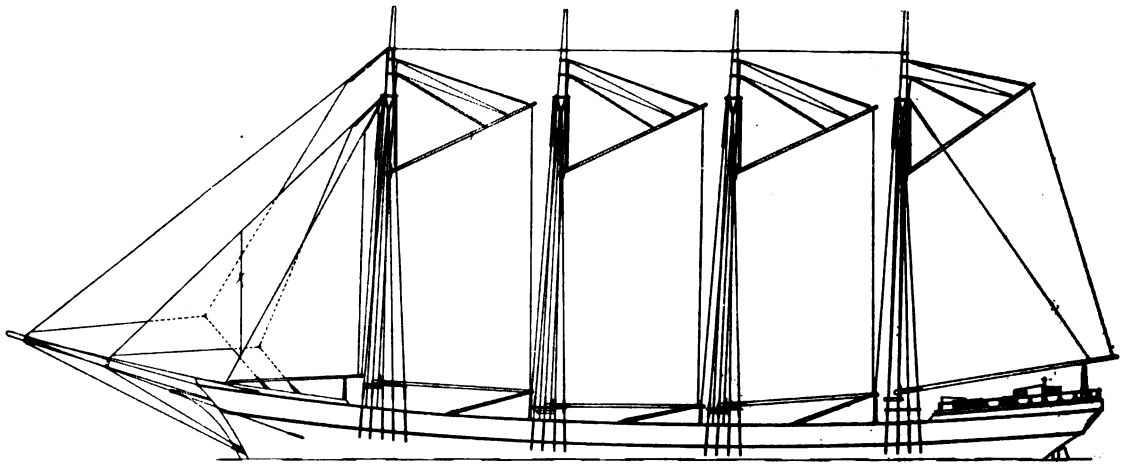
The shipyard branch of this company only came into being this last summer and has stepped into prominence under the following able management:

President, S. M. Mears (Senior); A. M. Mears (Junior), treasurer; C. W. Steel, secretary; J. C. Langville, superintendent of construction.

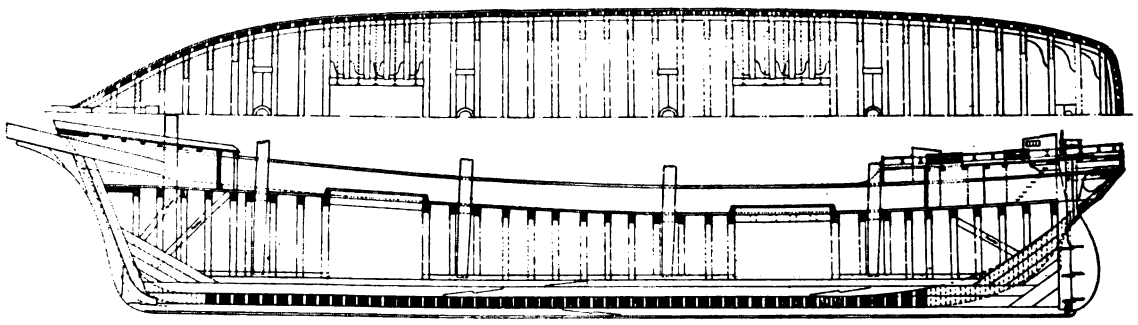
The location at Linnton on the west bank of the Willamette River, some eight miles from Portland, is ideal, and little excavation or filling in has been necessary. The vessels now building, as herein illustrated, are four masted fore and aft auxiliary wooden schooners for M. T. Snyder of New Orleans. Their dimensions being, No. 1 (to be known as the Warren P. Brown), 178 feet in overall length, 156 feet on the keel, 36 feet beam and 14 feet depth, moulded. This vessel to take American bureau classification. No. 2 differs only in having 11 feet greater length and to take Lloyd's classification. No. 1 is fully framed and being ceiled. No. 2 is about 75 per cent in frame. The keel of No. 3, which is a duplicate and for the same owner as No. 2, is now laid and levelling for a fourth set of ways is progressing rapidly, upon which the United Fruit Company's vessel will be built, the dimensions of which will be 255 feet over all length, 220 feet keel, 22 feet moulded depth, which in character will be a five masted fore and aft bald-headed auxiliary. Hulls of Nos. 1 and 2 have shelters and these sheds are well worth studying, showing as they do some very clever engineering in their strength and lightness. Their cost, so we were informed by A. M. Mears, was half that of other shelters of similar dimensions.

The vessels' construction, now under the able supervision of Langville, who by the way, until recently had charge of vessel No. 2 under Joseph Sloan at the Washington Shipping Corporation yard in Seattle, is receiving careful attention in detail, and first-class work is going into them.

Shaft tubes will be used entirely on these vessels in place of logs.



SAIL PLAN OF 4-MASTED AUXILIARY SCHOONER



PLANS OF AUX' SCHOONERS NOW IN COURSE OF CONSTRUCTION AT COLUMBIA ENGINEERING CO.'S YARD

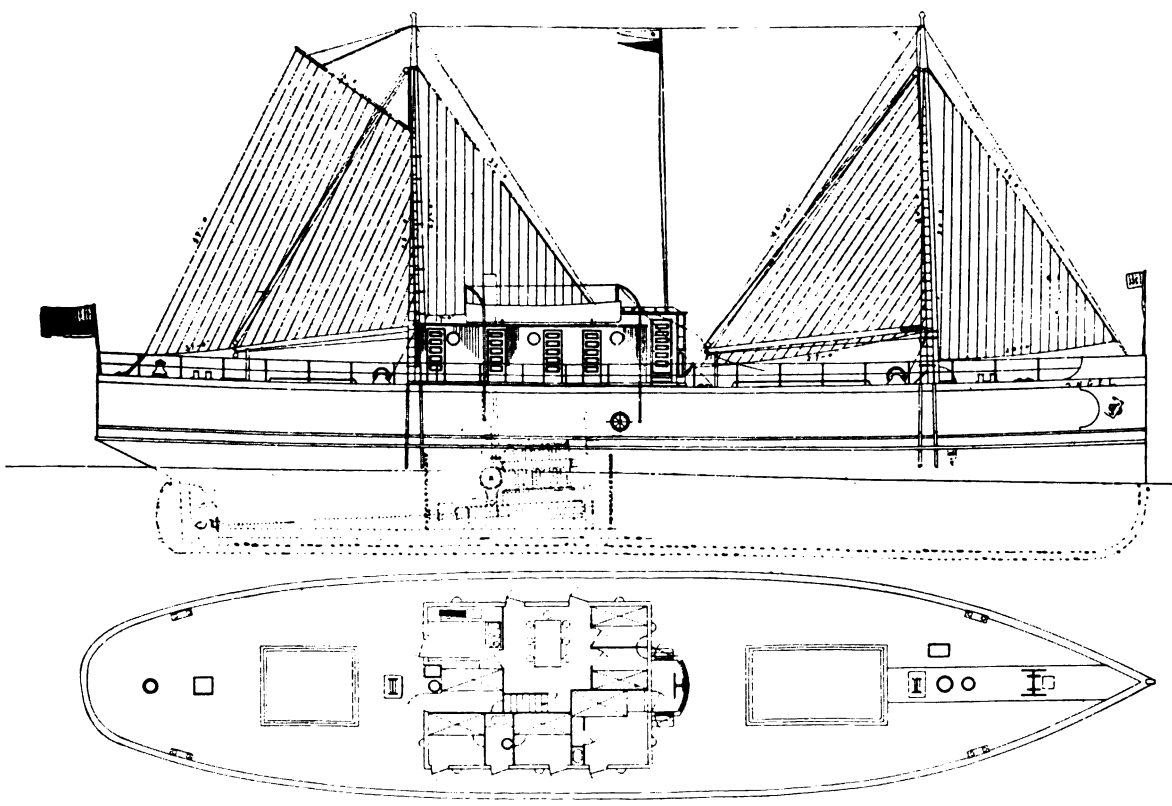
A slight arc is being built in all their launching ways as deep water is at hand and no chances are being taken of a jam during christening ceremonies.

While there has been some delay in the selection of motive power for ships 1 and 2, it is now understood that they are to be equipped with twin sets of 175 b. h. p. and 200 b. h. p. Wolverines respectively, No. 3 also having the larger sized set.

The Marine Iron Works of Chicago are supplying the steam donkeys and deck auxiliaries for these three vessels.

The engines for No. 4 have not yet been decided upon.

The original plant of the Columbia Engineering Company, which stands at the entrance to the shipyard, is busy turning out large fuel tanks for Lightship No. 50, now being converted at Portland, the vessels under construction by the Peninsula Shipbuilding Company and also those for their own ships.



M. S. "ANGELUS," MERCHANTS NAVIGATION CO., LOS ANGELES

M. S. "ANGELUS."

This vessel is being completed at Portland, Ore., from plans and specifications prepared by Capt. V. S. Terry of the Merchant's Navigation company of Los Angeles, who have recently purchased the bare hull and are now completing same for the purpose of engaging in the San Pedro and West Mexican coast trade.

The motive power will consist of two 4-cylinder 125 b. h. p. Union heavy duty motors with deck auxiliaries of the same manufacture being a 9 h. p. combination winch and windlass forward having two wildcats for handling the ground tackle, with a second 6 h. p. winch by way of after hold with double cargo booms at each hold.

M. S. Angelus is 120 feet over all by 26.9 beam with a loaded draft of about 13 feet. The engine room separates a fore and an after hold which have a depth of 10 feet in the lower and 6 feet 6 inches clear in 'tween decks.

Large fuel tanks are placed in the wings of the engine room and also in the fore lower hold, giving a radius of 3,500 miles. The water tanks are carried in 'tween deck aft. Schooner rig has been decided upon as shown in the cut except that a try-sail is likely to be used in place of the gaff-headed mainsail.

The deck house amidships combines wheelhouse and comfortable officers' quarters with roomy galley and messroom, the deck hands being berthed forward in the forecastle.

The owners expect to have the vessel in commission during the latter part of July.

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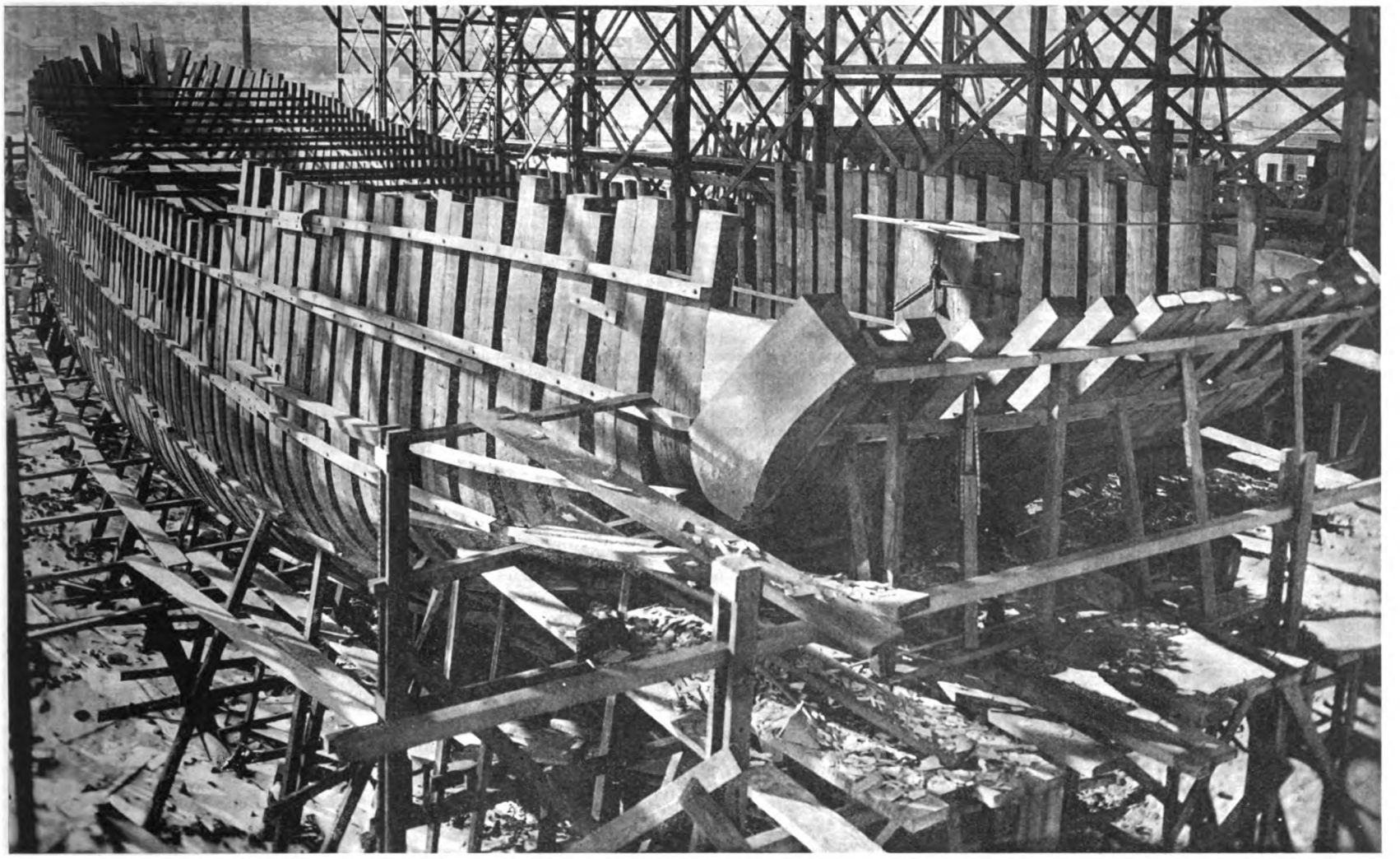
of the Columbia Engineering Co.



ABOVE, THE WARREN P. BROWN IN FRAME; BELOW, SHIPS AND SHEDS. COLUMBIA ENGINEERING CO.'S YARD

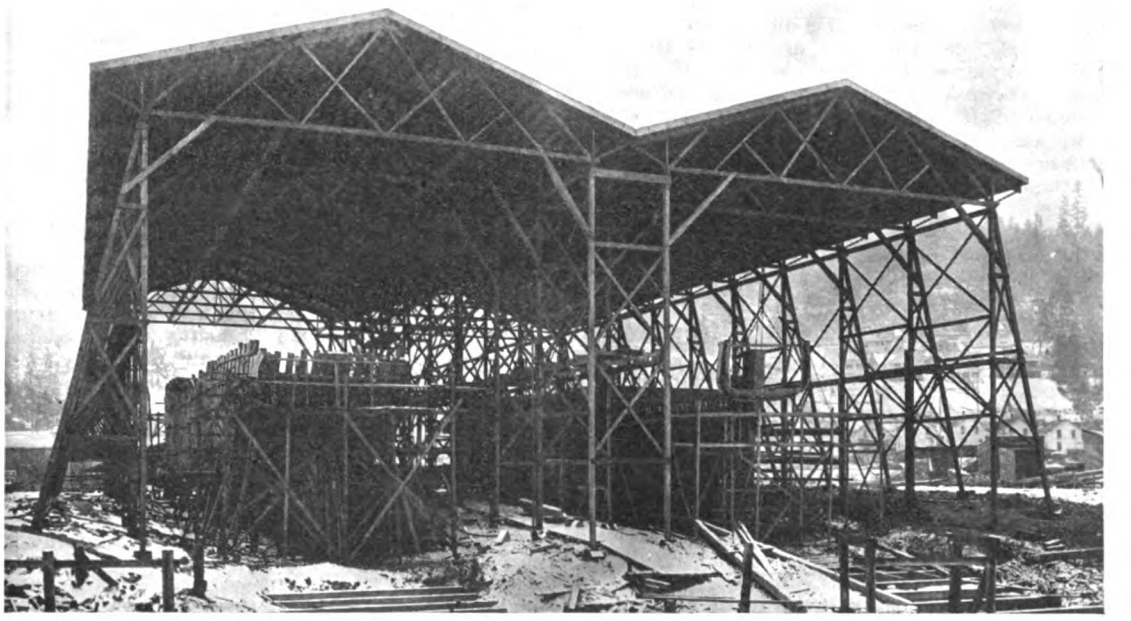
DIESEL TANKER OVERHAULED AT NEWPORT NEWS.

In November, 1912, the motor-driven tanker "Juno," was placed in service, and she was equipped with the first high-powered reversible Diesel engine that the Werkspoor company, of Amsterdam, built for marine purposes—this motor being 1,100 b. h. p. (1,460 i. h. p. at 115 r. p. m., with mechanical efficiency of 78 per cent, and an m. e. p. of 105 pounds per square inch), or equivalent to about 1,300 steam i. h. p.

This ship has recently been docked at Newport News to have the Lloyds No. 1 Survey, which takes place at the end of four years' service. According to Mr. Charles Bailey, the chief engineer of the Newport News Shipbuilding & Dry Dock company, a thorough examination was made of the hull and machinery, but very little work on the engine was found necessary. One of the company's engineers accompanied the Juno to the Capes, and reported the running of the machinery as very satisfactory.

The Juno is of 4,300 tons displacement, and carries about 2,500 tons of cargo, on a d. w. c. of 2,675 tons, at an average loaded speed of 9¾ knots, and with a fuel consumption of a little under five (5) tons of crude oil per day. Her engine has six cylinders, 22 ins. bore by 39⅜ ins. stroke. Her engine-room staff consists of Chief Second and Third Engineers, four oilers and two cleaners. The lubricating oil consumption is about 20 gallons per 24-hour day. Her length b. p. is 258 feet, with 45-ft. beam, and 18½ ft. draught, and her trial speed was 10½ knots. Her owners are the Anglo-Saxon Petroleum company of London.

It may be remembered that with the old design of Werkspoor-Diesel engines there was not considered enough space between the valves for cooling purposes, and about a year ago a new cylinder design was produced in which there is at least four inches of cooling water between every valve, and this was found to be so faultless that the builders were not contented with adopting it for new engines, but fitted the new design of cylinders to some of the older vessels in service. Juno was one of these ships, and having the new cylinders, new pistons naturally had to be put in to fit and the opportunity was taken to use the latest design. A section of crankshaft also was fitted. This was at the beginning of the year since when the engine has been running splendidly, and goes to prove how necessary is a sea-going experience to produce a satisfactory design of marine Diesel engine. Previous to the completion of the "Juno," which was a little over four years ago, Werkspoor had only fitted three small motorships with Diesel engines, the highest of these being 450 b. p. h. so the perfection of the Werkspoor engine of today hardly could be expected. Yet she really has done very well in service and the performances of this ship will do much to induce shipowners to place orders for motor vessels in a general way.



AMERICAN DIESEL EXECUTIVE VISITS EUROPE.

A. E. Ballin, general manager of the McIntosh & Seymour corporation of Auburn, N. Y., left about December 1st for Stockholm, Sweden, to visit the Aktiebelaget Diesels Motorer, of which his company is a subsidiary and the American licensee. The engine built by these concerns is of the four-cylinder type known in Europe as the "Polar" engine and here as the "McIntosh & Seymour." The Stockholm concern also builds a very successful two-cycle engine.

Mr. Ballin is expected to return to this country some time in January after a series of conferences.

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MOTORSHIP

A journal devoted exclusively to Commercial Motor Vessels and their operation. Issued on the 25th of each month.

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"NONE SO BLIND," ETC.

"No sir! I'm altogether too busy, and I have troubles enough now, without fooling with motorships."

The speaker was a prominent, and we must admit, successful steamship operator.

And yet it happens that while this very Napoleon of shipping considers himself so strongly intrenched by his large and at present exceedingly active fleet, competitors are maturing all plans for construction of modern standardized motor vessels.

The introduction of the internal combustion engine has brought about one of the greatest revolutions in ocean and coast wise transportation in all history. The operator who ignores this impending development will perforce pay heavily later by reason of superior facilities and lower costs of the competitor who employs motor propelled vessels.

A USEFUL HINT TO MOTORSHIP OWNERS.

Some oils have more power-giving qualities than others, so when purchasing oil fuel for your motor vessels, endeavor to purchase, if the price will allow, fuel having a fairly high calorific value. For instance an oil having a calorific value of 18,000 British Thermal Units will give a consumption to the engine of about 10 per cent better than an oil with a calorific value of 20,000 British Thermal Units.

Specific gravities need not be given much consideration unless they take into account the deleterious constituents which the oil may contain whilst still being below the maximum specific gravity specified.

Hence the best economy cannot always be obtained by purchasing the cheapest and lowest grades of fuel oil that the engine will burn. It becomes a matter for the ship owner to calculate when he is in position of having the analysis of oils obtainable in the districts, where his ships are operating. A comprehensive discussion on what kinds of fuel should be used was given on page 16 of the December issue of MOTORSHIP, and copies can be obtained from the head office at Seattle, Wash.

HUMBUGS.

Motorship has been in receipt of numerous inquiries from readers inquiring into the merits of various compounds being sold by peddlers which are represented as greatly increasing the power and efficiency of gasoline. We publish below a communication from the director of the Bureau of Standards of the Department of Commerce, which shows that of the various preparations examined in no instance has it been found that any noticeable improvement in the fuel had been made. The conclusion is obvious that these vendors are simply deluding purchasers into the belief that their concoctions have merits which they do not possess:

November 28, 1916.

Editor Motorship: Replying to your letter of the 14th inst. regarding materials to be added to gasoline for the purpose of increasing power, etc., the Bureau has made certain tests of a number of these materials with results which may be explained somewhat as follows:

Two broad classes of claims are made for these materials: (a) That they remove the carbon deposit from engine cylinders, and (b) that they increase the power or mileage or decrease the gasoline consumption; all of which amount to about the same thing.

From the nature of the case it is almost impossible to get any definite proof in regard to (a). The carbon deposit in the cylinder of an engine running under normal service conditions depends upon so many things, such as amount and quality of oil used, tightness of rings, sort of service as to speed and power and many others, as well as upon operation of the carburetor, and besides it requires so long for a considerable deposit of carbon to collect under anything like proper conditions, that the whole problem reduces to a matter of judgment rather than measurement.

Some tests have, however, been made with engines, in truck service, automobile service, and on the testing block, and these show, for the few materials thus tested, that whatever effect they may have, if any, is too small to be of any great importance. Of course only a very limited number of materials have been tested in this way but there is a strong presumption that the other materials would show about the same results.

As for (b), increases in power, etc., very conclusive tests of a number of materials have shown that there is no measurable difference between the power produced by gasoline with, and the same gasoline without, the added material.

Insofar as power and gasoline consumption are affected by the carbon deposit in the cylinders, if any of these materials should actually reduce the carbon deposit they might thereby improve the performance of an engine.

The natural conclusion from the tests so far performed is that nearly if not quite all the seeming improvement in engine operation when these "elixirs," etc., are added to the gasoline is due to the reduction in the proportion of gasoline used, caused by readjustment of the carburetor which is nearly always recommended to be made when the new fuel "dope" is added. It is, of course, a well known fact that many engines, particularly automobile engines, are habitually operated on too rich a mixture mainly for the sake of ease of starting and satisfactory operation when first started, and that a reduction in the proportion of gasoline to air will often produce all the desirable results claimed for these "tonics," etc., without the addition of any foreign material whatever.

Respectfully,
S. W. STRATTON, Director,
Bureau of Standards, Department of Commerce,
Washington, Nov. 28, 1916.

REJUVENATION OF OLD SHIPS.

Much has been written of late with a surrounding of romance, of old vessels unearthed in all quarters of the globe where they were abandoned as useless after everything removable and junkable had been stripped from their poor wornout hides and how they have been brought back into service and sold for an amount equal to their original cost. In enabling this to be done the Diesel engine is playing an important part, for whereas their boilers and steam engines have long since passed an age of safety and usefulness, their shell and decks with patches as numerous as the proverbial coat of Joseph will hold together for a few years longer. Some of these resurrections will surely turn the bones of their one-time proud owners in their long neglected and forgotten places of burial and the only thing of beauty will be the Diesel engine hidden from sight.

Schooner rigged with a short nose-pole protuding from a straight stem will entirely disguise many a former well-known steamer and whilst their hermaphrodite appearance will assuredly turn the stomach of a sailor, the owners will take comfort and hide their fears and blushes behind fat profits on stormy nights.

ECONOMY IN DIESEL SHIPS.

The East Asiatic company, owners of many Diesel-driven motorships, have found that compared with their steamers some of their motorvessels show an economy of 68 per cent. There need be no wonder why they sold all their steamers and replaced them with motorcraft. All their ships have the Burmeister & Wain type of Diesel engine installed except a few smaller craft which have surface-ignition oil engines, such as the Bolinders.

PROPOSED SHIP FOR TRAINING YOUNG LADS

Although there are dozens of motor auxiliaries and full powered motorships now under construction in America, shipowners seem to be making little or no attempt to train engineers for such vessels, and a little co-operation would seem advisable.

The policy of German ship owners could with advantage be followed. The Deutsche Schulschiff-Verin has an auxiliary Diesel engined vessel of 1,800 tons gross which both trains young lads as sailors and as motor engineers. The Deutsche-Schulschiff-Verin is a society voluntarily supported by ship owners and the ship is named the Grossherzog Friedrich August, and is a three-masted barkentine 280 ft. o. a. by 250 ft. b. p. with 42 ft. beam and a mean draught of 17 ft. on a displacement of 2,370 tons. The Diesel oil engine installed is of 600 i. h. p., and its operation and handling affords valuable training to the budding young marine engineers. She was put in service in April, 1914.

We suggest that ship owners in the United States contribute funds for a similar object. If any ship owner will come forward with a substantial start, MOTORSHIP will immediately commence an active campaign to secure sufficient funds to purchase, or build such a vessel, and to obtain the lads and instructors to man her. Who will be the first to start the ball rolling? There would appear to be no reason why such a ship should not carry a certain amount of cargo and so become self-supporting once she is in service.

THE ENGINEER QUESTION.

Recently the writer was discussing the subject of motorships with the superintending-engineer of a large East Coast shipowning company, and the "engineer-question" came up. This gentleman agrees with a suggestion put forward by the writer, namely, that little difficulty would be found in obtaining good oil engineers if the shipowners would be willing to spend the same total amount monthly in wages for the engine-room staff as would be paid in the case of a steamer of similar capacity. This would mean that an engineer on a motorship would receive about 50% more wages than the engineer of a steamer without any extra expense whatever to the owner because it is merely transferring the wages of the stokers. Even if the work is a little harder at the start the extra wages will be sufficient inducement for the engineer to stick to the motorship. Furthermore, a high-grade of man would develop.

For the next two years large full-powered seagoing American Diesel ships will be so comparatively few in number that it will not be easy for an engineer to quit one job to fall into another, unless he goes back to the steamer on reduced pay. When thirty or forty big motorships are in service there will be plenty of fairly well-trained men available, and the numerous large motor auxiliaries shortly to be in service will greatly help matters.

An owner recently stated that it was no use for him to order an ocean-going Diesel ship because there are no engineers available.

That is just the point. There are few engineers because there are but few Diesel ships, and the men won't train unless there are jobs open for them.

Ten years ago there were no taxi-drivers because there were no taxi-cabs. But when the motor cabs were put on the streets they did not lack drivers for them—the old horse-drivers having quickly made themselves proficient.

It is the same with motorships. By the time they are afloat there will be engineers to run the machinery, if only shipowners will take the proper precautions. The man who orders a big Diesel-ship tomorrow has from one to two years in which to train the engineers of his steamers. As each ship is ordered so can he send a couple of men into the builders' works to assist in the final construction stages of the engines. The extra wages will do the rest. Other sides of the engineer question have been discussed in previous numbers of MOTORSHIP.

MOTORSHIP IS EDUCATIONAL.

On page 23 are two most interesting lists of motorships owned by the Nobel Naphtha Productions Co., of Petrograd, Russia, and the East Asiatic Co., of Copenhagen, Denmark, dating from as far back as 1903 and 1909 respectively.

We venture to state that the average shipping man had never previously heard of the former and only vaguely of the latter, making evident the fact that MOTORSHIP apart from its technical value is fascinatingly interesting in its educational sphere.

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Aberdeen Shipbuilding Co., Pioneer Builder, in New Location

CAPTAIN ANDREW PETERSON

ABERDEEN SHIPBUILDING COMPANY.

Born in the northern part of Sweden in the year 1853, Capt. Andrew Peterson emigrated to the United States in the early 70's. After sailing before the mast for a few years, he quitted the sea to serve an apprenticeship to shipbuilding in the New York and Camden (New Jersey) yards, and, thus following in the footsteps of his father and grandfather, both Norwegian ship builders. The early 80's found him a full-fledged ship's carpenter in the employ of the Bendixen shipyards, Eureka, Calif., from whence, after fourteen years, he moved to San Francisco and entered into business for himself.

In 1913 Peterson established a new yard in Raymond, Wash., where he built the steam schooners "Salano" and "Mukilteo," together with barges for the Chicago, Milwaukee & St. Paul Ry.

In February, 1916, with an order from Wilson Bros. & Co. of San Francisco for the steam schooner "Oregon," a transfer of the plant was made from Raymond to Aberdeen, Wash. The keel for the Oregon was hauled into position by horses and five months later the completed vessel was launched, at which time the five-masted fore-and-aft auxiliary schooner "Columbia River" (for Balfour, Guthrie of Portland) was in course of construction, together with a second steam schooner, "Idaho," a duplicate of the "Oregon," also for Wilson Bros., San Francisco.

The more recent contracts signed by this Aberdeen shipyard include: One five-masted auxiliary schooner and two motorships, with a third auxiliary schooner under option. This company whilst closing its books for 1917 refused contracts offered by San Francisco interests owing to impossibility of delivery on time, as large extensions to their plant are necessary, including a fourth set of ways and three shelter sheds 60x60x300 covering the existing ones.

Particulars of the new ships contracted for are: One five-masted fore-and-aft baldheaded auxiliary motor schooner for Howard Saether of Norway, 290 feet over all, 49 feet beam and 24 feet depth of hold; to be equipped with twin 385 b. h. p. Skandia oil engines, delivery Aug. 1, 1917.

The two motorships, sister vessels of the shelter deck type, are for W. R. Grace Co., being 225 feet over all, 43 feet beam, lower hold 16 feet and upper 9 feet, delivery being May 20 and August 20, 1917.

Referring to the "Columbia River," now on her first voyage, reminds us that prior to her launching it was generally remarked how extremely fine Peterson had modeled her aft and doubts were expressed as to her trim with a deck load, but she did trim, and beautifully, too, with 758,000 feet board measure in her hold and 672,000 feet board measure on her deck, leaving a few inches surplus aft to take care of her engines, fuel, etc.

ABERDEEN SHIP YARD, WASHINGTON

THE DIFFICULT POSITION OF MARINE SUPERINTENDENTS.

Sidelights of Importance to Shipowners.

T. O. Lisle

As months pass by, and the construction of new steam-driven cargo vessels continues all out of proportion to motorships, we become more and more convinced that the motorship question is one in which shipowners themselves (or the principals of big shipowning companies) should make personal investigations and not be content with leaving such work entirely in the hands of marine superintendents, or superintending engineers, and then unfairly saddling them with the responsibility of making recommendations that amount to decisions. This is vital to the interests of shipowners, for their technical assistants have everything to risk and little to gain by recommending motorships in preference to steamers. Exactly what we imply we will explain presently, but we hasten to say that our remarks intend to convey nothing disparaging against marine-superintendents, either individually or collectively.

When asked by a salesman to see an oil engine, or to witness the trials of a Diesel motorship, or to go aboard a visiting vessel, the invariable reply of the shipowner is, "I'm too busy to go myself, but will be glad to send my engineer;" or else "It's of no use my going because I have no technical knowledge, but I'll be glad to send my marine superintendent.—He's a very capable fellow and my decision would rest upon him in any case."

Everybody will fully agree that most of these men are very capable marine engineers and we would be the last to advise shipowners acting in direct opposition to decisions of their technical assistants on the motorship question, but owners should accompany these engineers on investigation visits, and thus inspire confidence into the man who will be responsible for the results.

While acknowledging that shipowners today are exceptionally busy, the plea of "too busy" is all bunkum, for no man is too busy to give up time to looking thoroughly into what may mean a million dollars, more or less, in economies, to him. If we were inclined to preach we would quote—"When you feel you are pushing your business, all is well; but when your business seems to push you, it is time to pause and set the house in order."

But we will not preach thusly because we realize that the "too busy" phrase is only a weak excuse of sliding out of being bothered with a matter which many shipowners have not yet learned to regard seriously.

Let us now bring into the light the predominant and salient facts of the case under discussion, namely, the difficult position of the marine superintendent, to which we doubt if any shipowner ever has given thought.

To do this we must view the situation from the marine superintendent's point of view, which necessarily is different from that of every one else concerned.

Acting upon instructions from his principal the marine superintendent commences his motorship investigations with an entirely open and unbiased mind, except in a few instances where, being a hard-headed steam man of the old school, he may be a little skeptical or dubious as to the advantages of the new-fangled machinery. Generally however, he can be given credit for being perfectly honest in his intentions and impartial in his convictions.

He inspects such motorships as are available, witnesses the shop tests of oil engines, reads literature dealing with the subject (some good, others distinctly harmful and dangerous in the gross misrepresentation of the real facts), obtains the views of his engineering friends and then quietly turns over in his mind the pros and cons thereof.

What is the logical—in fact almost natural—outcome of his deductions? He has seen for himself both successes and failures in oil engines and motorships, he has heard bad rumors and wondrous stories of economies effected. In many cases where faulty running of motorships has resulted he can obtain no true reason for the causes because of the foolish secrecy that often is maintained.

He is satisfied that if the engines operate all right very remarkable economies will be effected and the earning powers of the ship increased about 15 per cent, but the "bug" ever before his eyes is, "Will the oil engine prove reliable?"

It may, or it may not turn out reliable, is his assumption, which makes this particular point seem to him somewhat of a gamble. If the oil engine by some unfortunate chance gives unsatisfactory results and a hundred thousand dollars of machinery has to be dumped on the scrap heap, he, as marine-superintendent, would have to bear the brunt of the blame.

On the other hand, the obvious operating economies, and the still larger earning powers of the motorship do not so fully concern his particular department, but more directly concern the owner. Therefore, in the event of success, his department will not particularly or directly benefit, and it is his department for which his first thoughts are concerned. He is there to make it pay, or lose his position.

He knows steam-engines blindfolded and is sure of their reliability, although boilers often bring deep lines on his brow and gray hairs to his head. But he knows that by advising steam for the next ship he is "playing safe," because with him it is a known quantity.

Furthermore, if a motorship is ordered, it means extra work and worry to him. Not only has he to learn all about an engine that is new to him, but he has to furnish engineers who already know how to run the motors.

What would you do in such a situation? Why, you would vote "steam!" So, can we blame the marine-superintendent? But we can, and should, blame the ship owner, for allowing such a situation to arise.

The motorship is a pronounced economic when selected with due discrimination, and it is the owner's pocket that ultimately benefits—not the marine superintendent. Hence it is the owner's duty to personally investigate the motorship proposition, and not add to his engineer's burden by saddling him with the entire responsibility of the decision. By all means leave the selection of the make and type of Diesel engine to be installed to the marine superintendent, for that is a case where his experience and engineering knowledge can be used to the best advantage.

T. O. L.

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Wrinkles on Hot-Bulb Installation by a Practical Engineer

This article will be of value to engineers engaged upon the actual work of installing these engines, Mr. Murphy having handled the "Great Bear" and other more recent installations. —Editor.

When installing engines of the hot bulb type the same general rules are followed as in the case with gas engines as far as lining-up, etc. In the larger installations it will be noticed that the power is put into fewer cylinders of far larger bore and stroke, which means a crank shaft of greater diameter and in turn means that far more care must be used in bedding and lining-up than is the case with the average gas engine, the greater weight per square inch of bearing surface causing them to heat up very quickly.

The bed plates of the large hot bulb engines are not as heavy as our heavy duty gas engines in proportion to the r. h. p., therefore the bed timbers should be amply heavy, especially in the 4 and 6-cylinder installations. They should where possible, go well fore and aft of the engine as most engines of this type have very small diameter fly wheels and some no fly wheels at all. Where the engine bed is of pine or other soft wood it is well to face it, with a slab of iron-bark or oak, under the engine. A flimsy engine bed is a poor way of saving money and means bearing trouble until rectified and the extra oil used on the shaft will soon eat up the amount saved on timber. With the larger engines I have always found it a good plan to leave them a little high, especially where the timber used in the engine bed is not thoroughly seasoned. The amount they are left high can be regulated by the intermediate shafting. Take for instance a 160 h. p. engine of 2 cylinders weighing 12 tons and only 10 or 12 feet long, this is bound to settle considerable the first few months.

It is a good plan to make the space between the bed-timbers oil tight, to hold the oil that drips from the crank case and bearing. I have noticed that the foremost firms of naval architects on the coast have for years put a galvanized iron pan under the engines in these installations. This answered the proposes of fire preventative in keeping the oil out of the bilge and when worked in conjunction with an oil filter results in considerable saving of oil.

Most boats do not bother with two grades of oil, for use in cylinders and bearings. Take for instance a schooner with a pair of 4-cylinder 320 h. p. engines using about 20 gallons of cylinder oil per 24 hours, costing about 38 cents per gallon, $7.60 total cost per day. At a very conservative estimate we will say 50 per cent of the oil finds its way to the oil sump, which in a 30-day trip gives us a total of $3.80 for 30 days—$114 saved.

Another instance is an auxiliary schooner running between San Francisco and Honolulu using 12 gallons of lubricating oil per day of 24 hours; taking an average 15 days each way with oil at 38 cents per gallon will give a total of $136.80 cost of oil for one trip. If the filters were used it would cut the oil bill to at least one-half, effecting a saving of $68.40 a trip.

In my own experience the oil pan has saved its cost in different cases in catching nuts, fittings, and tools that would have otherwise gone into the bilge and been lost.

In the smaller plants a small hand pump is used to take the oil from pan to filter, in the larger a small steam pump driven by compressed air is used. It is surprising that filters have not been used more generally in the large gas engined boats.

A good size for the lubricating storage tanks is 5 per cent of the total fuel oil tank capacity. This tank should be located so that the force-feed oilers can be filled by gravity as it is surprising the amount of oil that is wasted in filling the oilers by hand with small cans.

Practically all hot bulb engines use kerosene for heating the heads in starting. A tank of 30 to 50 gallons capacity is used for a pressure tank and usually filled about two-thirds with an air pressure of from 50 to 105 pounds applied. A larger tank could be used but it would be a waste of air as this size is ample for any engine. Some manufacturers supply a 1½ gallon tank with a hand pump, but this is more of a nuisance than anything else. The kerosene storage tank can be about 300 gallons capacity, but a good rule for the average installation is one gallon to the h. p. This tank should be located in a cool place and preferably where the pressure tank can be filled by gravity. The tube from the kerosene pressure tank should be led to the engineer's stand before branching off to the burners, as some times it may happen there be only one man in the engine room and it might be necessary to light the burners while approaching a dock. I have seen installations where it was actually necessary to climb over the engine to light the burners. The style of burner spoken of here is the pre-heated coil burner which is furnished by 90 per cent of the engine builders. In the atomizing type of burner the arrangements are about the same.

The fuel is taken from a small tank instead of from the main storage tanks as in the average gas-powered boat or in small steamers. This tank is known as the day or service tank. In size it should not be smaller than one-third of a gallon to the h. p. Some boats have day tanks running as high as one and one-half gallons per h. p. There is no advantage in very large day tanks, except where they are made with hand holes and used as a settling tank. Where a large tank is used the vertical section should be as short as possible so as not to vary the head of oil on the fuel pumps, though this is more important on the day tank used for water than on the oil tank (where water injection is used.)

In locating the day tank two things should be kept in mind. First, to keep it as near the engine as possible so as to be able to use short direct piping to the fuel injection pump. Second, not to get it too high, as too great a head of oil may cause the oil to leak past the valves on the fuel injection pump, and cause the pumps to deliver more oil than they should with the consequent carbonization of the rings and combustion chamber. Of course the day tank could be located below the injection pumps but this is not very practical. A small leak in the suction side would result in the fuel pump taking air and in turn would cause a failure to start or irregular firing as the oil delivery line to the cylinder must be absolutely free from air. The day tank outlet should be anywhere from two to five feet above the fuel pumps. Between the day tank and engine there should be a strainer and filter or a combination of both is better. The former consists of a gauge cup in a cast-iron box. The oil enters the top and goes out of the bottom leaving the sediment in the screen. A very effective type being two of these (with double connections so that one side can be cleaned while the engine is running.) The later type consists of a cast iron pot with a flanged cover usually held in place by a yoke. A ring about one inch wide half way down cast on the inside supporting a brass frame with a piece of fine gauze soldered to the frame, this in turn bolts to the ring, the oil enters the lower part, passes up through the gauze. The water and sediment is drawn off through a cock in the bottom. It also has a vent which leads to a point slightly higher than the top of the day tank. This filter should be about 5 to 10 gallons capacity. The gauze strainer having a large cross section seldom needs to be taken down for cleaning.

Most installations use a very small steam pump for filtering the day tanks. This same pump should be manifolded so it can be used to pump from one tank to another for trimming ship or other purposes. It is surprising how very little air these pumps use. A small plunger pump worked off one of the main engines could be used for this purpose but has the disadvantage of being useless when the main engine is shut down.

For circulating water on the larger boats especially, four sea-cocks should be provided consisting of two wing cocks located near the water line in addition to the two near the keelsons as where the ship is sometimes running in shallow water or scraping over mud flats, the circulating line and water jackets become filled with mud and sand, accompanied sometimes with disastrous results, especially with engines of large bore. A mud box should be fitted on the suction whenever possible. The bilge pump which comes with most engines should be cross-connected to the engine jacket for use in case of failure of the circulating pump. It is also a good plan to connect up the fire pump in the same manner as most ships have a fire deck pump run by a small gas or oil engine. This latter connection comes in handy to circulate the main engine when stopped after a long run, where repairs or replacements must be made in a hurry. The heat of the head and pistons radiate to the cylinder and base and make them very uncomfortable to work upon.

The circulation water pipe should be entirely free from stopvalves after it leaves the pumps and should have a relief valve when the engine maker does not supply one. Where part of the water is used for other purposes after it leaves the engine such as sanitary purposes or jacketing the exhaust where it passes through the deck, etc., a spring loaded check can be used but it must be remembered that the engine jackets are as a rule not designed to carry any great weight. It is a good idea to leave a few tees in the line for future use and a pressure gauge connection. A thermometer is a good thing to have as close as possible to the engine especially in the large engines.

Some hot bulb engines have water injection, and the tank used for this purpose is about the same size as the fuel oil service tank. The same principle applies to this as in the case of piping from the oil service tank, except that the pipe leads straight to the engine without filter or strainer. Of course where river water is used direct out of the jackets, some sort of strainer should be used. Some manufacturers use an injection pump for putting the water into the cylinders, others allow it to drip on a plate in the air by-pass and regulate with a small valve on each cylinder with a sight feed attached. I once rigged up a float chamber on a boat where the head of water varied considerably and it made a big difference on long runs in keeping the heads at a constant heat. In the few cases where salt water is used it is taken directly out of the engine jackets.

The exhaust on most ships calls for special consideration. Most of the large engines of the hot bulb marine type are 2-cycle, having large diameter exhaust pipes and give off considerable heat and will not stand any back pressure. Probably the best place in a wooden ship is straight up and through a stack with a muffler between. The large chamber seen on the outboard side of some engines does very little muffling, being more of an expansion chamber. In steel ships the exhaust can be elled up through a hollow steel mast but it should have a double air space around it where it passes through the deck. In twin screw ships where no sail is carried, the exhaust pipes can be led up each side of the mast some distance above deck. In any case it should be carried as far as possible above deck, so as not to interfere with navigation in thick weather. Where it is necessary to water jacket the exhaust pipe, the water jacketed section should be as short as possible, as water jacketed exhaust pipes in large boats where the exhaust is led any distance are a continual source of trouble. Exhausts led out through the stern or side have not been much of a success. There is no reason why the exhausts in the larger installations are not more often used for keeping up a low head of steam in a donkey boiler, to run small auxiliaries, an oil burner to be used in port or when more steam is required, as for the winches. In this case care should be taken to have the total cross-section of the tubes at least two or three times the cross section of the exhaust, where it leaves the engine, so as to eliminate any chance of back pressure. For this same reason all right angle bends in the exhaust should be avoided and where possible the diameter of the exhaust pipe should be increased.

It is no trouble to design an ordinary muffler but quite the opposite to design one which will operate without back pressure.

Compressed air is to the motorship what steam is to the steamboat and too much care can not be taken in the piping and connecting up. Some motorships have their total air capacity in one tank. This I have found to be a big mistake for several reasons. It takes up considerable room valuable for other purposes and must be made considerably heavier than the smaller diameter tank to stand the same pressure but the main reason is that in case of loss of air (for instance, due to a stuck starting valve), the ship is rendered helpless. True the auxiliary air pump can be started but this takes time, especially alongside of a burning dock or on a lee shore.

The better way is to use four or six smaller tanks connected up independently of each other. The valves should not be put on the tanks, but on a manifold at the engineer's stand, a valve for each tank. The pressure gauge is connected at the end of the manifold and will show pressure of one or of all tanks. In this way a couple or tanks can be kept in reserve.

The total capacity of the air tanks will depend on the type of engine, while those having the pre-ignition type of reverse can get by with slightly

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smaller tanks than the air reversing type. Again a tug boat or boat engaged in similar work requires more air capacity than a seagoing boat, or at least a larger compressor. For the former type of engine I would say eight times the volume of the cylinder or cylinders used in starting would be a good size for the total capacity of the air tanks, at about 200 pounds pressure. For the air reversing type it should be about twelve times the volume of one cylinder. For tug boat work, it would be well to have half as much again. These sizes are sufficient for all purposes outside of starting, such as whistle or small air pumps. All tanks should have a small cock for letting out the oil and water that will collect. The safety valve should be on the air compressor wherever it is possible. W. P. MURPHY.

THE MARIE'S UNFORTUNATE VOYAGE.

The auxiliary motor schooner Marie, formerly the barkentine Archer, now owned by Swayne & Hoyt, returned to San Francisco December 5, after an absence of over eight months on a voyage to the Orient, during which she experienced considerable difficulty. On her voyage out she encountered a good deal of stormy weather, but the greater part of her trouble was due to the faulty method of connecting up her propeller shaft, which resulted in the engine performing badly. The faulty connection has now been remedied, and it is expected that no further engine trouble will be experienced.

The Marie is a vessel of about 1,200 tons, 186 ft. long, 32 ft. beam and having a moulded depth of 18 ft. 6 in. Relying mainly on schooner rig, she has as auxiliary power a 125 h. p. Mietz & Weiss Diesel engine—the one which was exhibited at the Exposition in San Francisco last year. On her trial trip she made about 7½ knots light, and 6 knots loaded, under power alone, using about .65 lbs of Calol per hour. The engine worked perfectly on the trial, and for the first few days after her departure on March 24.

To permit the propeller to revolve freely when the boat was under sail alone, the shaft had been connected up with a jaw clutch, and this, according to the engineer's record, commenced to hammer about the fifth day out, and finally caused a counterbalance of the crank-shaft to come off, putting the engine out of commission until the vessel reached Honolulu.

Honolulu was reached April 10, and the jaw clutch was replaced with a solid shaft, in time for the Marie to get away April 15. The engine was again running in good shape, and continued to do so until a few days off the Japanese coast. Here occurred another mishap, which was apparently an after-result of the jaw clutch; a crystallized bolt broke in another counterbalance, letting it come off, and the revolving crank drove the heavy block of iron through the bottom of the crank case. This definitely stopped the engine until repairs could be made at Yokohama, which was reached May 13. Here a week was consumed in putting a patch on the crank-case and replacing the counterbalance, etc., and she sailed for Manila May 21, arriving July 8. The engine was used to some extent on this trip, but its performance did not appear normal, and constant trouble was expedienced with the bearings. The vessel was given a general overhauling at Manila, including repairs to the bearings, and she sailed August 21, putting in at Kobe October 17, and sailing from there on her home trip October 20. The trouble with the bearings continued, making it impossible to use the engine to any great extent, and giving rise to a suspicion that the crank-shaft had been twisted at the time of the second accident. This could not be verified, however, until she was taken to the Union Iron Works at San Francisco for repairs, early in December. Here the suspicion was found to be correct, and it was definitely ascertained that the whole trouble, after the repairs made at Yokohama, was due to the twisted crank-shaft, which caused the bearings to wear badly and made it impossible for the engine to give proper service. The work of straightening and replacing the shaft was completed about Christmas.

HANLON SHIPYARD PLANS.

Dan Hanlon, of the Hanlon Shipyard & Ways company, is prepared to make great improvements to his plant if he can secure a 25-year lease, with privilege of renewal, of land occupied by and adjoining his present yards. The matter was taken up Dec. 12 with the Oakland city council, when Mr. Hanlon stated that improvements representing an investment of $1,000,000 would be made if the lease were granted. The improvements planned include two good-sized, drydocks, as well as extensive shop improvements and dredging. The ground occupied by the present Hanlon shops is held under a 15-year lease from the city, with 13 years still to run. The company has contracts for a large number of vessels, and Mr. Hanlon states that plenty of backing can be had if a favorable lease can be secured.

CALOL FUEL OIL FOR MOTORSHIPS

The arrival of two to three motorships per month on the Pacific coast from over seas, and the building at the present time of about eighty motorships on the Pacific coast, show the satisfaction that is now being obtained from motorships. Part of this satisfaction is the assurance of a supply on the Pacific coast of a fuel oil suitable for the engines, and sufficiently low in price to make the motorship the most economically operated ship at the present time.

Calol Fuel Oil has given complete satisfaction in Diesel engines of the constant temperature and constant pressure cycles, also in engines of the hot bulb or hot plate type.

The necessary qualifications of a fuel oil for a motorship are as follows:

(1) It shall have a viscosity or fluidity such that it can be readily pumped.

(2) It shall have a safe flash point.

(3) It shall not contain such a proportion of high boiling compounds that cannot be entirely consumed in the engine. The action of the oil when sprayed into the cylinder is that the low boiling point compounds are first distilled and combined with the air in the cylinder, combustion taking place. The high boiling point compounds are "cracked," that is, formed into low boiling hydrocarbons, tar, free carbon, and fixed gas, the amount of each of these depending on the amount of high boiling compounds in the fuel oil, the temperature, pressure, oil surface exposed, and time.

If the free carbon and tar are not entirely consumed in the engine, they become deposited on the exhaust valve which makes the exhaust valve stick or prevents it closing properly, thus losing temperature, compression, and efficiency.

Calol Fuel Oil manufactured by the Standard Oil company, California, has the necessary qualifications as a fuel for motorships.

Calol Fuel Oil can be furnished at the Standard Oil company's docks at Richmond on San Francisco Bay, California; Point Wells and Seattle on Puget Sound, Washington; Willbridge on Columbia River, Oregon; and barge service is maintained at Seattle, San Francisco, and San Pedro.

Preparations are being made to make dock deliveries at San Pedro and Honolulu.

REPAIRS TO THE NUUANU.

On account of a burnt-out thrust bearing, the motor schooner "Nuuanu" was recently towed to San Francisco from a nothern port for repairs, and the reports that have so far appeared on the matter tend to give the mistaken impression that trouble was experienced with the engine.

The "Nuuanu," a three-masted oil barge of 10,000 bbls. capacity, was recently equipped with a 320 h. p. Bolinder engine, as described and illustrated in Motorship for November. It was found difficult at the start to get an engineer familiar with this type of equipment, and it was necessary to get along with an engine-room force which was not as well qualified for the work as was desirable. Notwithstanding this, the Nuuanu gave satisfactory service on her regular run, with the engine in practically constant use, for about a month up to the first of December, when the mishap mentioned put the propeller out of commission.

The trouble is attributed entirely to the lack of experience of the engineers, who allowed the thrust bearing, designed to run in oil, to go dry and burn out; and as the boat was wanted immediately at San Francisco, and the weather was unfavorable, she was towed down. The thrust has been repaired, and no further difficulty is anticipated.

The accident which happened to the thrust bearing was due altogether to rank carelessness as the engineers decided to change the lubricating oil in the thrust bearing, and removed the drain plug from the bottom of same to drain off the used oil.

It is presumed and partly verified that, either due to the excitement of getting orders to start up, or to rank carelessness, they neglected to place back the plug in this oil chamber and that when a fresh supply of oil was put in the thrust bearing, it ran through into the engine bilges; and shortly after the engine was started up, the thrust being dry, overheated and badly scored the go-ahead steel thrust collar, and caused the pins or studs in the supporting brass center piece for carrying the rollers to become badly worn, with the result that the rollers stuck and flats were ground into same rendering the rollers practically useless.

The engineers did not discover that the thrust was overheating until the ship was under way. At the time it was noticed the vessel was in the Second Narrows of Vancouver, a very dangerous place, which made it imperative that the vessel's headway be continued until it had passed through this section. On account of the extreme overheating of the thrust, the thrust collars or plates were cracked, due evidently to a cold water hose having been turned on them while in a heated condition. Temporary repairs were effected by shifting the go-astern collar into the go-ahead position and refacing the scored collar and using that in the go-astern position with a thin brass washer behind same to make up for the amount taken off the plate.

There were other machinery troubles entirely outside of the main engine, and we understand that a large gas engine used for pumping purposes caused a great deal of trouble and had to have extensive repairs made to it. A small auxiliary compressor operated by a 5 h. p. engine also gave considerable trouble, and as these accidents have appeared in the newspapers as Machinery Troubles it was concluded that they were part of the propelling engines and their deficiencies were all attributed to the main engines.

JOHN L. BOGERT
165 Broadway
New York City
INTERNAL COMBUSTION ENGINE SPECIALIST
Consulting Engineer to
American Krupp System Diesel Engine Co.

Hannevig Shipping Co.
Brokers for the Chartering, Sale and Purchase of Steam, Motor and Sailing Vessels
NAVAL ARCHITECTS
23-25 Beaver St. NEW YORK
Cable Address: Hannevig, New York

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Remarkable Performance of the Auxiliary Bark "Elfleda"

By Finn Hannevig.

Editor's Note—The following article by Finn Hannevig, member of the famous Norwegian shipping family, illustrates forcefully the degree to which a motor vessel can rise to an emergency and demonstrates how much greater the reserve force of an internal combustion engine is than most owners imagine. Mr. Hannevig's native modesty prevents his stating the extent to which his own good seamanship contributed to the success of this unique voyage.

Now that ship owners are going over to the use of motor power in both cargo and passenger vessels to a greater degree than ever before it may be interesting to the readers of MOTORSHIP to learn of an instance where two small oil motors installed in a sailing vessel, for port use only, saved both the ship and its valuable cargo of copper ore from the pitiless waves.

The Norwegian bark "Elfleda" had put into Lisbon, Portugal, with masts and rigging dismantled after having encountered a severe gale. Owing to local conditions in the port it was impossible to repair the damage there and it was decided, not without some misgivings, to take her as she was on the trip to Middelsborough, England, relying entirely upon the two 120 i. h. p. Bolinder engines, which had been installed solely for use in going in and out of harbors, and which enabled her to make a speed of between four and five miles an hour loaded.

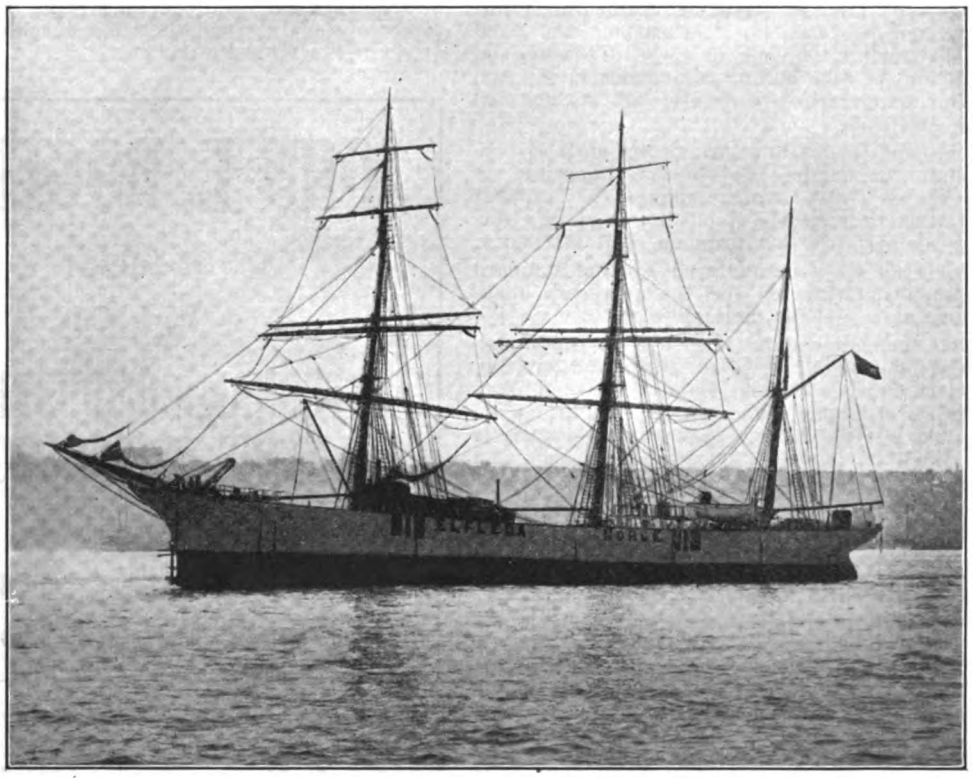
It was a daring enterprise but the owners and the insurance people decided it was less desperate than trying to tow the ship around. As luck would have it we had the advantage of a southerly wind and sea all over the Bay of Biscay and everything went fine as far as The Downs, England. Here, according to the British war regulations we were forced to take on board in addition to a pilot an English Marine Guard consisting of six blue jackets with loaded guns, to insure against the cargo's being taken to Germany.

After leaving The Downs we encountered nothing but a continuous series of severe westerly and northwesterly gales which forced the ship first within sight of the Norwegian coast and later down on the coast of Belgium. During these storms the rest of the rigging was lost altogether with both life boats and the deck suffered considerable damage. On the tenth day, however, the gales ceased and the engines, still in splendid working order were able to bring the vessel safely to its destination.

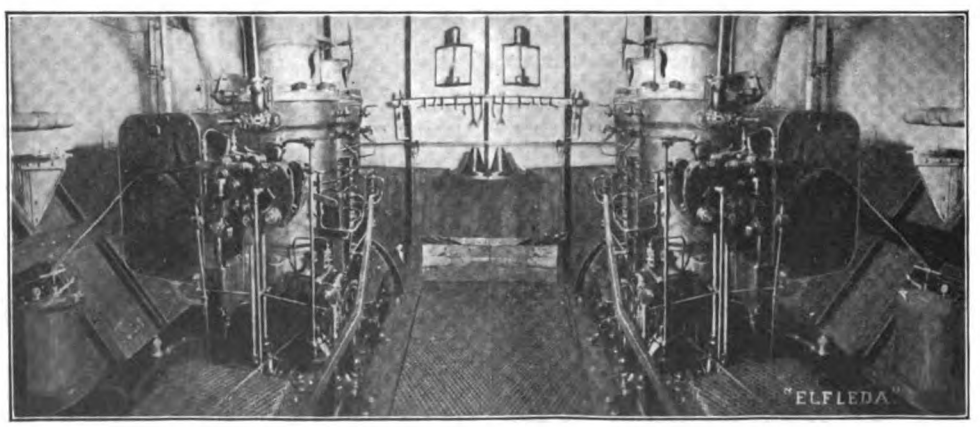
Although these engines were not installed for continuous work they had been running incessantly for more than three weeks without a single break down.

FINN HANNEVIG, OF HANNEVIG SHIPPING CO.

One of the newer factors in the American shipping field who has already begun to make his presence felt is Finn Hannevig, a member of the famous Hannevig Brothers, of Norway, who is now doing business under the name Hannevig Shipping company. Mr. Hannevig is engaged in the sale and purchase of shipbuilding contracts and the general activities incidental to a business of this character. He is also a very capable naval architect, being a graduate of that famous Norwegian school, Horton College. He expects to make a trip to the Pacific coast in the near future and will, conditions being favorable, open an office there.



NORWEGIAN AUXILIARY BARK "ELFLEDA"



"ENGINE ROOM OF ELFLEDA," SHOWING TWIN BOLINDER INSTALLATION

A 100-FOOT MOTOR-DRIVEN CARGO BOAT.

Now that the freight-carrying business has increased to such an extent that boats of all kinds are being pressed into service to meet the demands, the accompanying design from the board of E. Lockwood Haggas, naval architect of Philadelphia, is timely and shows an interesting type of domestic commercial vessel, especially suited for lake or river service.

This boat is of wood construction and has an overall length of 100 feet, beam 20 feet, and loaded draft of 7 feet, giving a carrying capacity of 75 tons. She is especially adaptable for carrying general freight, for besides the large hold the deck arrangement is such as to give extra stowage space. Two derricks facilitate the handling of the cargo. These are operated by electric winches. Quarters for the crew are provided forward, while staterooms for the captain and engineer, together with galley and mess-room, are aft.

The engine-room is below the pilot-house aft. The ventilation of this compartment is well taken care of by the stack and cowls. A 150 h. p. Diesel type, or surface ignition motor will give the boat a speed of 10 miles an hour.

"Pequoit," as she is named, was designed for Mr. Whitaker for use on Delaware and Chesapeake Bay and as yet the make of engine has not been decided on. The owner was inclined to favor the Southwark-Harris motor, but deliveries are so long on Diesel engines that there has been a delay in placing the order.

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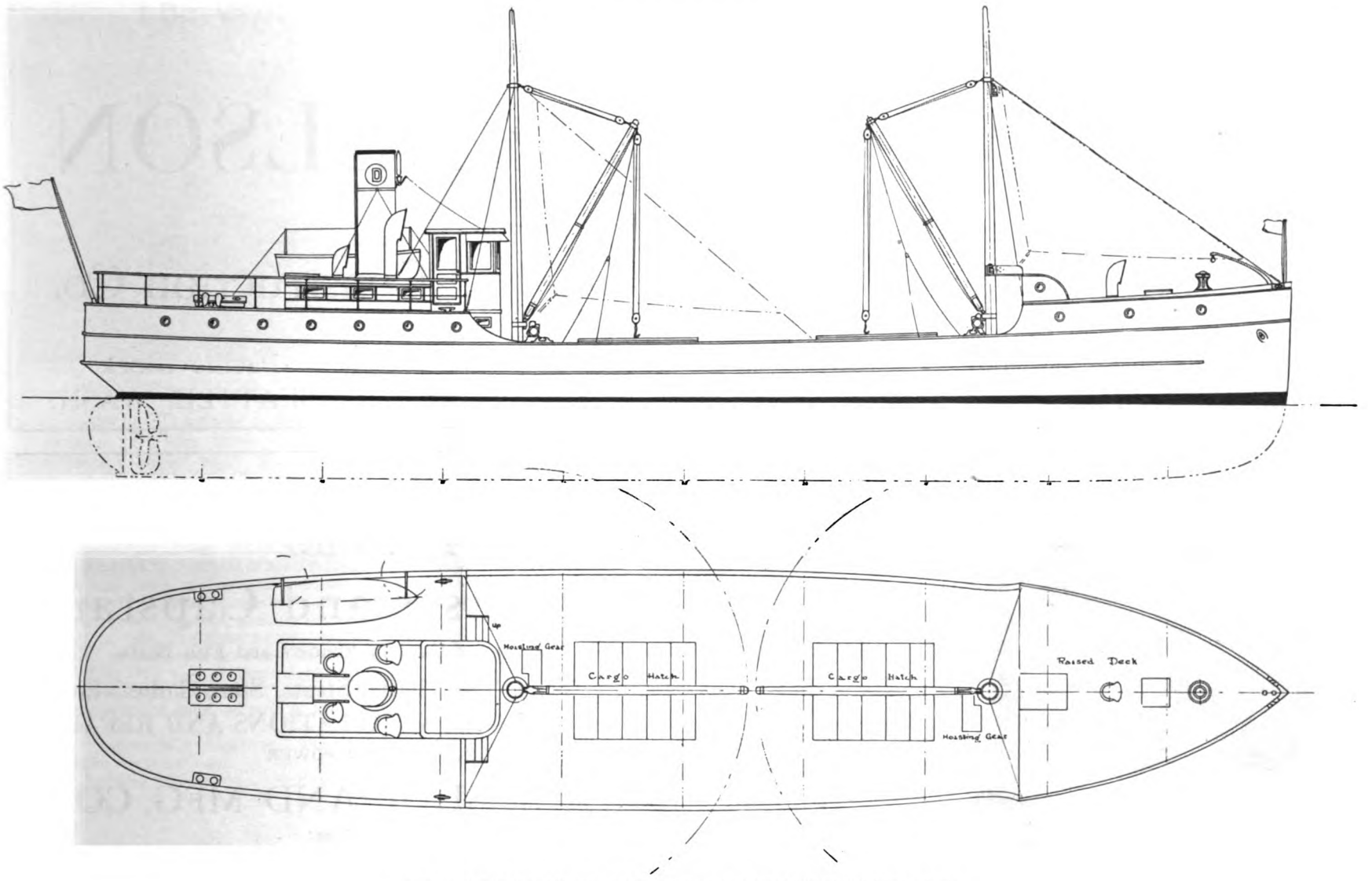
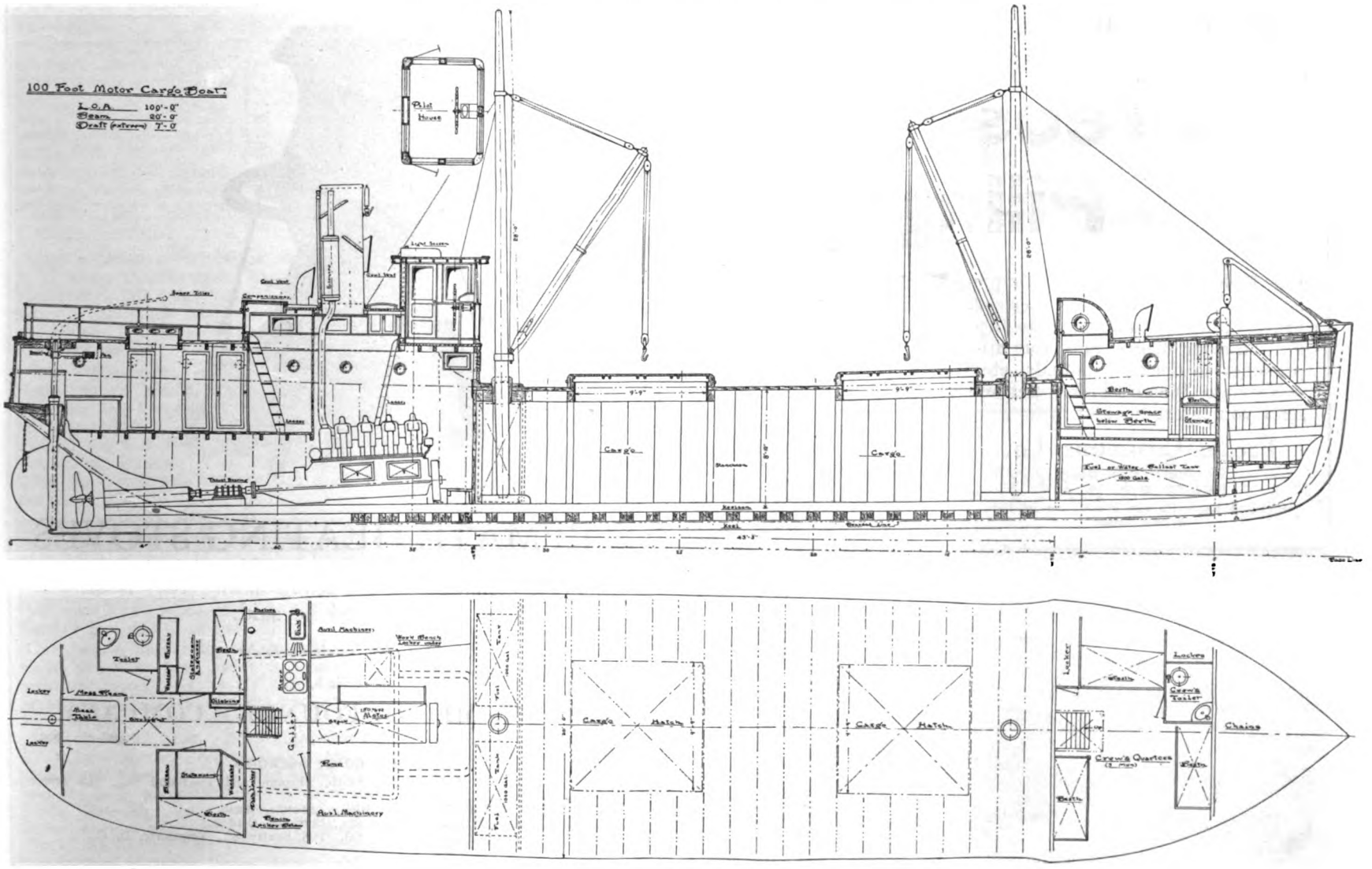


M. S. "PEQUOIT," 100-FT. FREIGHTER, BY E. LOCKWOOD HAGGAS, N. A.



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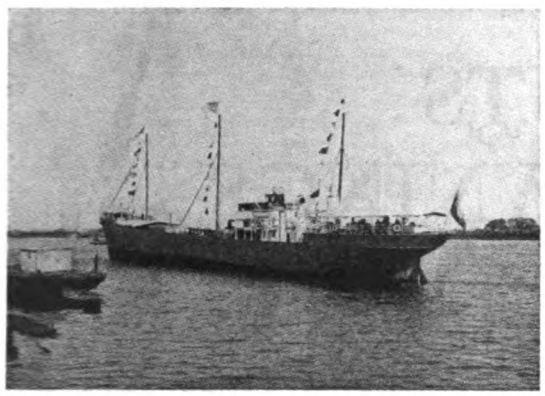
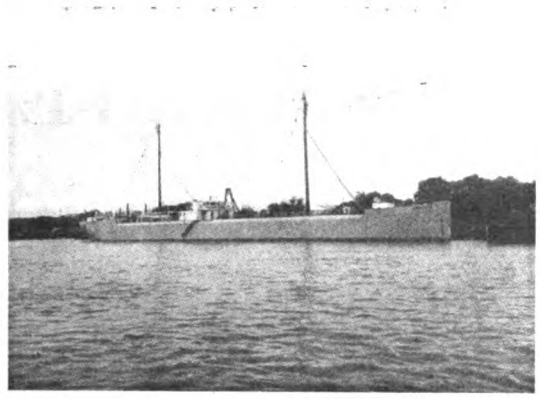
The World's Largest Diesel-Ship Fleet





MOTORSHIPS "EMANUEL NOBEL" AND "ZOROASTER" OWNED BY THE NOBEL NAPTHA PRODUCTION CO.

THE WORLD'S LARGEST DIESEL-SHIP FLEET.

On this page are illustrations of two large Diesel-driven motor ships placed in service in 1909 and 1911, respectively, and these are interesting because of their size and power for that early stage of the development and because they are units of the world's largest motorship fleet. At the same time these vessels cannot be classed among modern ocean-going motorships, as their engines are little more than stationary sets altered to suit marine purposes, and they are in service on inland waters, namely the Caspian Sea, Russia. In fact, the first named has non-reversing engines and maneuvering of the ship was arranged by the use of large hydraulic slipping clutches, and by a series of gears and shafting connecting up the forward part of the engine with the after end.

The "Zoroaster," however, had two direct-reversible engines, each of 500 b. h. p. at 200 r. p. m. driving twin-screws. But these, too, were vastly different from marine steam engines (and it is along steam-engine lines that the modern motorship has developed)—having no cross-heads; but trunk pistons and enclosed crank-chambers. Nevertheless they accomplished some excellent work.

The "Zoroaster" is 270 ft. long by 33 ft. 4 in. beam, 20 ft. moulded depth, and 15 ft. 6 in. draught, and has a duplicate in the "Galilei"—a sister motorship. The engines are of the four-cycle type, and were built by Ludwig Nobel, of Petrograd, Russia. The net cargo capacity is 2,200 tons, and she also carries mails and passengers.

The "Emanuel Nobel" is a tanker, and after eight years service is, I believe, still giving a very good account of herself, although her engines were built at the time when little was known about marine Diesel engines. Of course, they were by no means ideal in design and offered but few features of accessibility.

Her sister motorship is the "Karl Hagelin," which is 380 ft. long by 46 ft. beam, with 25 ft. moulded depth, and 16 ft. 6 in. draught. Her actual cargo capacity is 4,821 tons of oil, and her two 660 b. h. p. Nobel-Diesel engines drive her at 16 versts an hour. Both ships are owned by the Nobel Naphtha Productions Co., who took over their first Diesel ship—a vessel of 800 tons d. w. c. and 360 b. h. p. in 1903—or 13 years ago. That vessel has since been broken up, but her old Diesel engines are now driving dynamos on land. Up to the end of 1911 the same owners had no fewer than 21 large Diesel driven ships in service totalling 14,000 d. w. c., and equipped with machinery aggregating 8,640 b. h. p. Some of these were tugs. From then onward until the commencement of the war the Nobel Co. constantly added Diesel-driven motorships to their fleet, which now must be the largest motorship fleet in the world. What they have done since the war we Westerners have no means of knowing.

The accompanying list represents part of the Nobel Diesel-engined fleet up to the end of 1911. There should be added the "Emanuel Nobel," "Karl Hagelin," "Madjar," "Oljak," "Galeili," "Zoroaster," "Wandal," and "Sarmat," the latter being the old boat that was broken up.

Name of Vessel—	Brake Horse-power	Loading Capacity in tons	Length in feet	Beam in feet	Draught in feet	Number of Main Engines	Number of Cylinders per Engine	R. P. M. of Engines	Year when Launched
			ft. in.	ft. in.	ft. in.				
Belemor	140	160	110 6	17 0	3 6	1	3	260	1908
Kirgis	600	960	176 0	30 0	2 11	2	3	240	1908
Welikoross	800	1,280	188 0	32 0	3 6	2	3	200	1909
Maloross	800	1,280	188 0	32 0	3 6	2	3	200	1909
Jakut	320	400	105 0	22 2	5 0	2	4	240	1909
Samojid	280	350	132 9	19 0	3 3	2	3	260	1909
Robert Nobel	700	1,760	260 0	34 0	14 0	2	4	200	1910
Kalmuk	600	960	190 0	30 0	2 11	2	4	240	1910
Ostjak	400	480	190 0	30 0	2 11	2	4	240	1910
Lesgin	400	480	175 0	27 0	2 4	2	4	240	1910
Osetin	400	480	105 0	22 2	5 0	2	4	270	1910
Ingusch	200	208	140 0	22 0	1 7	1	4	270	1910
Masur	200	210	150 0	22 0	1 8	1	4	270	1911

DIESEL EXPERT ON COAST.

Alfred F. Gall, who has been connected with the Burmeister & Wain shops at Copenhagen during much of their large Diesel engine and motorship construction, and was later with the Akers Mek. Vaerksted, Christiania, Norway, supervising the construction of large Diesel engines, recently visited San Francisco looking after the prospects for the manufacture of such engines in this vicinity.

SOUTHWARK-HARRIS ENGINES ON PACIFIC COAST.

Frank G. Bryant, supervising engineer of the Southwark Foundry and Machine company of Philadelphia, has arrived in Seattle to supervise the installation of 225 b. h. p. Southwark-Harris Diesel in the "Comet," owned by the San Juan Fishing & Packing company. It is possible that Mr. Bryant may be located permanently in Seattle to handle the installations of this company.

ARRIVAL OF SOUTHWARK-HARRIS DIESEL LONG DELAYED.

The first of the long delayed Southwark-Harris Diesels to reach the Pacific coast is now in Seattle, being a six-cylinder engine of 225 b. h. p. and to be installed in the "Comet," owned by the San Juan Fishing & Packing company of Seattle, who purchased this engine through the Pacific Net & Twine Co., Seattle agents of the Southwark Foundry & Machinery company.

OPERATIONS FOR FOUR YEARS OF THE EAST ASIATIC COMPANY.

(Continued from Page 8.)

of a total carrying capacity of 237,200 tons have been ordered for delivery during the next 5 years.

Due to the war the M. S. "Falstria" was delivered from the builders in Scotland only at the end of March, and as the time of delivery of the M. S. "Lalandia" became very uncertain, the contract with the builders was cancelled against compensation to the company. As for the five-masted sailing vessel "Kobenhavn" which, as previously stated, is in course of construction with Messrs. Ramage & Ferguson in Leith, the time of delivery is also uncertain.

Notwithstanding the addition of new vessels the company's fleet has temporarily decreased during 1915 by 25,356 tons. The average age of the present fleet has thereby been reduced to 2.18 years. The average cost after allowing for depreciation stands at £10 12s per ton d. w. According to the above building program the fleet will for some years not exceed this average age, and will consist execlusively of twin-screw motor vessels. Although the vessels sold to the Steamship Company Orient had not all been handed over at the end of the year, the whole decrease in 1915, viz., 72,780 tons is taken into account in the appended list of ships. The amount to be realized by the sales is included in the present balance sheet.

The disorganization of finance resulting from the war did not cause the company special difficulties. Notwithstanding the larger amounts tied up in commodities than was the case at the end of the preceding year, the company has considerable sums to its credit at different banks.

It is proposed to apply this in accordance with the subjoined accounts which provide for a dividend of 30% to the shareholders, a further allocation of Kr. 4,000,000 (making the total for the year Kr. 10,000,000) to the reserve fund, which now stands at Kr. 20,000,000, or 80% of the share capital; a bonus of Kr. 1,682,868.28 to the board, managing directors and employees and Kr. 950,000 to the pension fund, leaving Kr. 778,375.78 to be carried forward to next year.

The Company's Fleet, as at December 31st, 1915.

Name—	Year Built	Tons Gross Reg.	Tons D. W.	I.H.P.
M. S. "Bandon"	1909	3,485	4,900	1600
M. S. "Chumpon"	1909	3,481	4,900	1600
M. S. "Pangan"	1909	3,487	4,900	1600
M. S. "Selandia"	1912	4,964	7,450	2500
M. S. "Jutlandia"	1912	4,874	7,600	2500
M. S. "Annam"	1913	5,295	9,940	3300
M. S. "Siam"	1913	5,295	9,940	3300
M. S. "Anholt"	1913	255	380	200
M. S. "Fionia"	1914	5,218	6,820	4100
M. S. "Tongking"	1914	5,259	9,812	3300
M. S. "Samso"	1914	387	545	160
M. S. "Falstria"	1915	4,358	7,000	2500
M. S. "Panama"	1915	5,259	9,812	3300
M. S. "Australien"	1915	5,259	9,812	3300
M. S. "Columbia"	1915	5,569	10,400	3300
M. S. "Chile"	1915	5,569	10,400	3300
		68,014	114,611	

New Vessels Contracted for to Be Delivered During the Next Five Years.

Twenty-three new vessels contracted for as mentioned in the report, including the sailing ship "Kobenhavn," with a total carrying capacity of 237,200 tons.

Tugs, Lighters, Etc., as at December 31st, 1915.

Copenhagen—	Tons Gross Reg.	Tons D. W.
Motor lighter "Transport No. 1"	100	150
5 Lighters	362	590
Bangkok—		
28 Sea-going and river lighters	2.294	3.355
7 Tugs and steam launches	217	...
	2,973	4,095

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Seattle Man Designs Patrol Boats

M. C. ERISMANN

The plans published herewith show the general appearance of two patrol boats to be built this winter for service in Southeast Alaska for the Alaska service of the U. S. bureau of fisheries.

The boats are to the designs of Martin C. Erismann, naval architect, Seattle, who was awarded the work in competition with proposals submitted by other Seattle naval architects.

The requirements to which the proposed vessels were to conform were transmitted in a letter specifying the boats to be not less than 40 feet in length, of plain but strong construction, with accommodations for two inspectors and a crew of two men. A small rig was to be provided, the small boat was to be stowed in a convenient place so as to be readily launched. The engine supplied to be of not less than 25 or more than 40 h. p. of heavy duty distillate type.

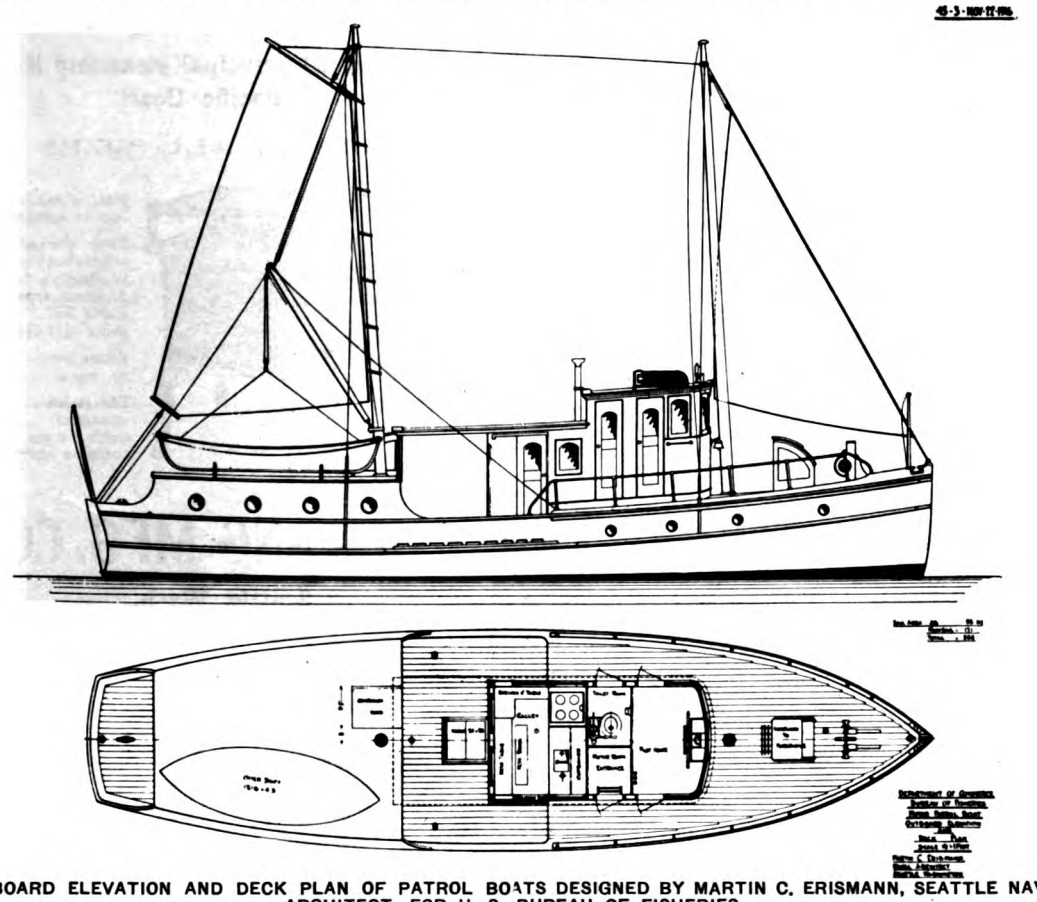
The plans accepted cover a boat 48 feet long, 12 feet 6 inches breadth, with a draft of 5 feet 3 inches, with 25-30 h. p. engine.

The boat is a development of the famous seine boat type of vessel used so extensively in the salmon fishery of Pacific waters with, of course, such modifications in the shape of the hull as would make the boats suitable for patrol duty.

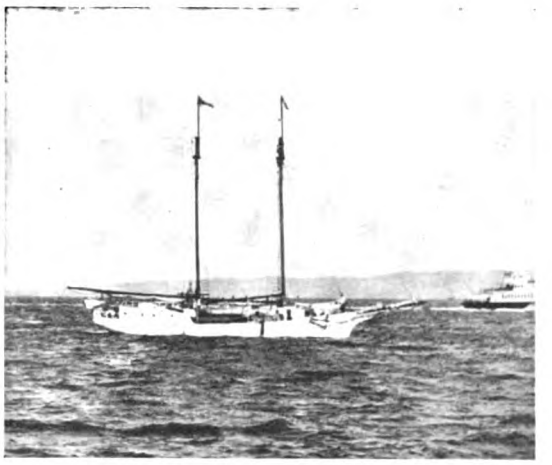
The boats have a raised forecastle on which is located the pilot house, engine room entrance and toilet. Aft of the break and on the main deck is located the galley. The main deck is to have a hatch for access to the hold where a small amount of cargo can be stowed. Aft of the main deck there is a raised house formed by a continuation of the ship's side; here will be located the inspectors' quarters, consisting of a saloon with extension berth and folding wash basin, aft of which is a private cabin with berth, wash basin, hanging closet, transom and table.

The sail plan is adequate for use in an emergency, and the boom for handling the boat, a 12 foot 6 inch Otter skiff, is simple and efficient. The boats are to be electric lighted, and give the impression that they will satisfy entirely the requirements and uses for efficient boats for patrol duty in Southeast Alaska waters.

The power equipment will consist of a 25 h. p., 3-cylinder 4-cycle, Frisco Standard engine. The contract for the hulls has been let to the Elliott Bay Launch & Engine Co., of Seattle, delivery to be made in three months.



OUTBOARD ELEVATION AND DECK PLAN OF PATROL BOATS DESIGNED BY MARTIN C. ERISMANN, SEATTLE NAVAL ARCHITECT, FOR U. S. BUREAU OF FISHERIES



"AVARUA" HAS GOOD TRIP"

The power schooner "Avarua," built by Wm. S. Brusstar for Atkins, Kroll & company, had her trial trip under rather unfavorable circumstances, but still gave a very satisfactory performance, and has done well since, according to latest advices. In launching, the propeller struck a block, and one blade was bent, reducing the engine speed from 310 to 273 r. p. m., but despite this she made over 7 miles per hour on a run around the estuary. A report has just been received from her captain on arrival at Honolulu, stating that the engine had given an excellent performance all the way out. The Avarua is a schooner of about 100 tons, powered with an 80 h. p. Union engine. She made the trip to Guam on distillate, but the intention is to use kerosene for fuel entirely on her trips among the islands.

NEW TOWBOAT FOR OAKLAND.

H. Anderson of San Francisco has just completed a 40-ft. tropedo stern towboat for Albert Moe of Oakland. She is 12 ft. in the beam, and has a moulded depth of 4½ ft. She is rather rough looking outside, but substantially built, with 4 by 6 in. and 4 by 8 in. sawed Oregon pine frames and 2-in. planking. The 30 h. p. Frisco Standard engine is placed well forward, with a low cabin aft providing sleeping and cooking accommodations for four men.

BUSY TIMES AT CRYER'S.

To take care of the four big power boats for the Alaska Packers association, Wm. Cryer & Son have had to build an extention of their shop on the landward side. Work is being rushed on these boats, which were described in MOTORSHIP'S last issue, and the first, now all planked up, will be launched about the middle of January. The Western-California Fish Company's boat, launched from Cryer's last month, is now giving satisfactory service. They have just finished the 28-ft. boat for the Crowley Launch & Towboat company, which will be shipped to South America, and are building another for the same company, 36 ft. long by 8½ ft. wide, to be propelled by a 20 h. p. Frisco Standard engine.

SIERRA ON FIRST VOYAGE.

The E. K. Wood Lumber company's new motorship Sierra, description and plans in November issue of Motorship, recently completed at Grays Harbor and powered with twin 320 h. p. Bolinders, arrived at San Pedro December 15 on her maiden trip, slightly over 5 days from Columbia river with 1,100,000 ft. of lumber.

TO NORTH POLE IN DIESEL-DRIVEN AUXILIARY.

Capt. Roald Amundsen, the famous explorer who first reached the South Pole, is to start for the North Pole in July, 1918. His ship will be a 800-ton oil-engined auxiliary now under construction in Norway. The engine will be a four-cylinder Diesel of 240 b. h. p. and there also will be a good spread of canvas on three masts. The value of the oil engine in exploration work was fully realized by Captain Amundsen on his expedition to the South Pole, his ship then being Dr. Nansen's old vessel, the "Fram," which had been equipped with a 160 h. p. Polar Diesel engine of the two-cycle type built by the A. B. Diesels Motorer of Stockholm, whose United States licensees are the McIntosh & Seymour Corporation, of Auburn, N. Y.

STEADY FLOW OF SKANDIA ORDERS.

The Skandia Engineering company of Seattle, has booked the following orders during the past month:

A. O. Andersen company, six 240 b. h. p.
G. Neutz (New York), two 240 b. h. p.
Aberdeen Ship Yard, two 350 b. h. p.
Washington Shipping Corporation, four 240 b. h. p.

The twin 240 Skandia installation in the "City of Astoria" (A. O. Andersen company), recently launched from the McEachern Yard, Astoria, is reaching completion. This is the first Skandia equipment north of San Francisco. A technical description of these trials, fully illustrated, will be given in a later issue of MOTORSHIP.

NEWS FROM FOREIGN STATIONS.

The M. S. "Fordonian" arrived at Mobile, Ala., with damaged machinery. This vessel was constructed in 1912 for service in the Great Lakes, and was fitted with a two-cycle type Diesel engine of Carels design, built by the Clyde Shipbuilding & Engineering company, of Glasgow. She was purchased, we understand, by an American company some time ago and has been in use in the East Coast trade.

Among Norwegian ship owners who have gone in extensively for motorships may be mentioned Mr. Fred Olsen, of Christiania, who has on order a number of Diesel engined vessels to be equipped with Burmeister & Wain, and Werkspoor four-cycle type motors, respectively, there being six ships altogether, consisting of three of each make of engine.

The first of these vessels has been just launched at Copenhagen, and this is a vessel of 9,500 tons d. w. c., and driven by two 6-cylinder 630 m. bore by 960 m. stroke. Burmeister & Wain four-cycle Diesel engines, each engine developing 1,550 i. h. p. at 125 r. p. m., which is expected to give the ship a sea-speed of 11.15 knots.

A large ship owning company has been formed in Europe, known as Baltischer Lloyd, who already have ordered one motor vessel of 1,440 tons gross, and a smaller one of 160 tons gross. It is the intention of this firm to construct a number of motorships built of concrete. The first is to be started immediately, and will be 300 to 400 tons d. w. c. It is to be built in the new shipyard which the company has established for the sole purpose of building concrete motorships.

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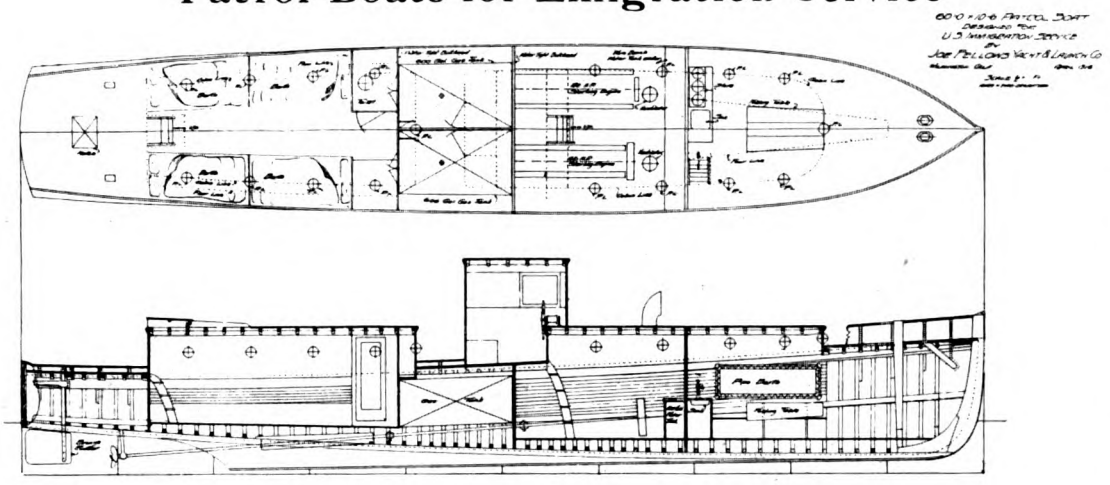
Patrol Boats for Emigration Service



PATROL BOAT FOR IMMIGRATION SERVICE.

The U. S. Immigration Service patrol boats Ellington and Azalea have been fitted with two 200 h. p. Sterling engines, which drive the boats at a speed which is known to exceed twenty-two knots per hour, but how much more than that is a secret of the service which so far has not been revealed. The boats were designed by Homer H. Evans and built by Joe Fellows Yacht & Launch company, at Wilmington, Cal. The first engines were 100 h. p. each, but the department decided to increase the speed and also to take advantage of the many important improvements recently made in the Sterling engines. The boats have ample accommodation for the crews and the immigration officers and have proved themselves seaworth in all kinds of weather. They have been such a success that the navy department has secured the plans and may make use of some of the ideas that form the features of the craft.

ERRISMANN DESIGNS STANDARD SEINE BOATS.

R. E. Douglas, of the Tee Harbor Packing Co., whose cannery is at Southeastern Alaska, has commissioned Martin C. Erismann, Seattle naval architect, to prepare plans for a standard type seine boat, 45 feet in length, 12 feet beam and having a draft of 4 feet 6 inches, from which the above company will, in the future, build its entire fleet of seine boats. The power equipment of each boat will consist of a 20 h. p., 2-cylinder, 4-cycle Frisco Standard engine.

Bids will be called at an early date on the first two of this fleet from Erismann's plans and specifications.

SCOTTISH FISHERIES ADOPTING MARINE MOTORS.

At the end of the year 1914 there were 694 motor-driven fishing boats on the Scottish waters. By the end of 1915, 117 new motorboats had been added to the fleet, making a total of 811. A number of these boats are of about 25 horse power, while others range from 60 to 120 horse power. According to the official returns there are no fewer than 3,571 sailing boats still employed in the Scottish fishing industry, of which about two-thirds are under 18 feet in length, so it is evident that there is a very fine field for the exploitation of low power motors, which must use kerosene or crude oil as fuel, as gasoline is too scarce and too expensive for the fisherman to consider using. During the beginning of October, one of the largest of these fishing boats was torpedoed in the North sea by a German submarine, but all the members of the crew were saved.

CRYER BUILDING MOTOR LIFE BOATS.

Wm. Cryer & Son are just completing several small motor boats, one of which, a life boat for the new steamer Ecuador, is considered the most expensive life-boat ever built here. It is 26 by 7 ft., with bent oak frame and cedar planking, put on lap-strake; all copper fastened, with copper tanks for fuel and air. The boat will accommodate 32 people safely. It is powered with a 12 h. p. Loew-Victor engine.

Another boat building at Cryers' is a 28 by 8 ft. towboat of stock design for the Crowley Launch & Tugboat Company. It is powered with a 10 h. p. S. F. Standard engine. Cryers have just finished overhauling Healy-Tibbitts' No. 3 towboat, a 56 by 16 by 6 ft. boat, with a 110 h. p. S. F. Standard.

U. S. PATROL BOAT "ELLINGTON"

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THE DIESEL ENGINE IN PRACTICE, by J. E. Megson and H. S. Jones, 1916. Price $2.00 net. 131 pages in handy size containing illustrations and drawings, covering oil engines and modern Diesels, written by practical men in a clearly understandable manner.

MARINE OIL ENGINES, by W. D. Martin, M. I. E. S., Technical College, Dundee, Scotland, 1915. Price 60c net. An elementary work which covers the smaller types of internal combustion engines of English manufacture, together with semi-Diesels and Diesels of foreign make.

GAS POWER, by C. T. Hirshfeld, M. M. E., Cornell University Professor; T. C. Ulbricht, M. M. E., formerly Cornell University Professor, 1914. Price $1.25 net. A simplified treatise on gas, gasoline and oil engines of the stationary type including chapter on gas producers.

GAS, GASOLINE AND OIL ENGINES, by Gardner E. Hiscox, M. E. Revised, enlarged and modernized by Victor Page, M. E., 1915. Price $2.50 net. A complete work of 631 pages with 435 engravings covering stationary, marine, motor vehicles and aerial, including Producer Gas.

OIL FUEL, by Edward Butler, M. I. M. E., 1914. Price $1.80 net. Third edition enlarged, 318 pages, 150 illustrations. A scientific text book on the supply, composition and application of fuel oil.

LAND AND MARINE DIESEL ENGINES, by Giorgio Supino, 1915. Price $3.00 net. Exhaustive treatise with data and plans covering modern Diesels, including rules governing classification societies for the classification of Diesel engines. 19 plates, 380 illustrations.

OIL MOTORS, by C. Lieckfeld, Civil Engineer, 1908. 266 pages with 306 illustrations. Price $3.60 net. A handbook for engineers and all interested in engines using liquid fuel, explaining development, construction and management.

THE SUBMARINE TORPEDO BOAT, by Allen Hoar, 1916. Price $2.00 net. An authoritative general treatise beautifully illustrated of interest to the layman apart from its technical value.

RADIODYNAMICS (1916), by B. F. Miessner. Price $2.00 net. Explaining the wireless control of torpedoes and other mechanisms. 112 illustrations.

GAS OIL AND AIR ENGINES, by Bryan Donkin, 1911, fifth edition. Price $6.00 net. A text book of 627 pages compiled by an eminent engineer, with revisions by Prof. Burstall and T. Graves Smith, M. I. Mech. E.

PETROL MOTORS SIMPLY EXPLAINED, by T. H. Hawley. Price 25c net. A small handbook covering Petrol engines of English manufacture.

PRACTICAL HAND BOOK, GAS OIL AND STEAM ENGINES, by John B. Rathbun, 1916. Price, flexible leather, $1.50. silk cloth $1.00. A comprehensive book on construction, operation and repair.

DIESEL ENGINES MARINE AND STATIONARY, 1915, by A. H. Goldingham, M. I. M. E. Price $3.00 net. Practically all makes of Diesel engines dealt with in detail and fully illustrated with plans and photographs.

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